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Economic Darwinism in the defense industry: an analysis of corporate responses

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ECONOMIC DARWINISM IN THE DEFENSE INDUSTRY:
AN ANALYSIS OF CORPORATE RESPONSES

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Principal Advisor: Dr. Richard Doyle

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This thesis identifies and assesses the corporate strategies adopted by the top defense companies as a result of the new defense spending environment. The model used throughout the thesis stipulates four corporate strategies: expansion, diversification, globalization, and rationalization. The thesis outlines the fundamental elements of each strategy and highlights the significant actions taken by the top defense companies. Finally, the factors that framed the selection of these strategies are examined. The compatibility between current skills and production capabilities with market opportunities was the most influential factor in strategy selection. Because of the lead time resulting from backlogs and aggressive cost cutting, the financial viability of the top defense companies is not at risk. The thesis concludes that each of the strategies was pursued to nearly the same degree and many of the companies are pursuing multiple strategies.

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Economic Darwinism in the Defense Industry:
An Analysis of Corporate Responses

by

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Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

This thesis identifies and assesses the corporate strategies adopted by the top defense companies as a result of the new defense spending environment. The model used throughout the thesis stipulates four corporate strategies: expansion, diversification, globalization, and rationalization. The thesis outlines the fundamental elements of each strategy and highlights the significant actions taken by the top defense companies. Finally, the factors that framed the selection of these strategies are examined. The compatibility between current skills and production capabilities with market opportunities was the most influential factor in strategy selection. Because of the lead time resulting from backlogs and aggressive cost cutting, the financial viability of the top defense companies is not at risk. The thesis concludes that each of the strategies was pursued to nearly the same degree and many of the companies are pursuing multiple strategies.

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I. INTRODUCTION

A. BACKGROUND

The United States has spent five decades building a military that is capable of fighting a Soviet-led global war. The Cold War could not have been won without a strong and dedicated defense industrial base producing large numbers of modernized weapons systems. Today the future of the defense industrial base is clouded by budget reductions and the lack of a credible threat.

The Department of Defense (DoD) defines the defense industrial base as the capacity of industry to produce goods and services that the DoD needs to meet its mission requirements [Ref. 1:p. 3]. It consists of tens of thousands of firms varying in size, degree of diversification, and product. The defense industrial base is a combination of private-sector capabilities and military owned and operated facilities such as shipyards and research and development laboratories. Tomorrow's defense industrial base will depend not only on government policies and DoD spending levels, but on the financial strength of defense related firms, their level of diversification, and their commitment to continue as defense suppliers [Ref. 2:p. ES-1].

The turning point for defense spending was in the mid-1980s. Throughout the early 1980s the Pentagon's budget grew

about five percent a year, after inflation, peaking at 371 billion FY1993 dollars in 1986. It has since tumbled 26 percent to $276 billion for FY1993. [Ref. 3:p. 84] This spending drawdown is the result of various developments, including the following: a general easing of tensions between the United States and the Soviet Union with the signing of the Intermediate-Range Nuclear Force (INF) Treaty in December 1987; other agreements on reductions in strategic and conventional arms; the growth of democracy throughout Eastern Europe; deficit reduction initiatives such as the Gramm-Rudman-Hollins law (GRH) of 1985; and a general uneasiness concerning eroding American economic competitiveness [Ref. 2:p. 1-2]. This new defense spending environment has created much uncertainty and placed financial pressure on those corporations that constitute the defense industrial base.

The United States is faced with competing demands for scarce resources and pressure to spend the "Peace Dividend" wisely. Defense spending must compete against domestic spending and deficit reduction initiatives. In response to the changing environment, companies in the defense sector need to "downsize or rightsize, get leaner and more flexible, all the while preserving or strengthening their critical technological edge." [Ref. 4:p. 100] Business reengineering and restructuring have become a necessary survival tool for even the largest companies.

While the total demise of the defense sector has not occurred, it remains in a state of flux. Chairman and Chief Executive Officer (CEO) of Loral Corporation, Bernard L. Schwartz states that, "Whether you call it restructuring, consolidating, or downsizing, the defense industry is reducing its workforce by thousands, producing fewer products, and closing plants at an extraordinary rate. Layoffs have affected every state, every age group, and every level--blue collar, white collar, uniformed, and civilian." [Ref. 5:p. 10] Yet the human toll cannot be measured simply by numbers. Schwarz predicts that the short-term confusion over which direction defense companies should travel will lead to program stretch-outs and delays that waste taxpayers' money. This ultimately leads to reduced technological innovation and lower readiness. [Ref. 5:p. 10]

Current events in Somolia, Iraq, and Bosnia are constant reminders of the importance of U.S. military readiness and the industrial support needed to maintain that readiness. Past wars and conflicts were not only won by soldiers, sailors, airmen, and Marines--but by technology. The survival of the defense industrial base is paramount to the security and stability of the United States. What will the future hold? Many analysts question the ability of the defense sector to maintain its technological edge and operate profitably in the future. Defense corporations have responded in many different

ways as they struggle to survive in this new era of economic Darwinism.

B. OBJECTIVE

The objective of this thesis is to identify and assess the corporate strategies that have evolved as a result of defense force and budget reductions. This will be accomplished by analyzing the financial and organizational impact of these reductions on the U.S. defense industrial base. Subsidiary research questions include the following:

1. What is the defense industry's scope of involvement within the national economy?

2. What is the new defense spending environment facing the defense industry?

3. What are the major strategies that will be employed in the defense sector?

4. Which, if any, of these strategies is favored by the defense sector? by Congress?

5. What are the limitations of each of the strategies?

6. To what extent will defense corporations pursue non-defense commercial opportunities?

7. What factors shape the decisions and strategies taken by defense contractors?

C. SCOPE

This thesis will examine the fifteen largest U.S. defense contractors, as determined by their 1992 contract awards, and their responses to the new defense budget environment. Table 1 provides a listing of those corporations that will be examined in this thesis [Ref. 6:p. 34]. The data is supplied

by Governments Executive's annual list of the top 100 defense contractors. It should be noted that the list includes General Motors (GM). Although GM's defense business is conducted primarily by Hughes Electronics, a wholly-owned subsidiary of GM, exclusion of GM's non-Hughes defense related revenue would omit nearly $1 billion in GM defense revenue, also placing it among the top 15. Most of this thesis will refer to GM-Hughes Electronics. AT&T's annual defense sales of $1.3 billion placed it among the top 15; however, they were excluded from the study based on their extremely small exposure to defense spending.

TABLE I: TOP 15 DEFENSE CONTRACTORS PER 1992 CONTRACT AWARDS

Company	1992 defense sales ($000s)	U.S. market share
1. McDonnell Douglas	$5,589,741	4.63%
2. Northrop	4,850,093	4.01
3. Lockheed	4,655,434	3.85
4. GM	4,558,227	3.77
5. General Electric	4,173,642	3.45
6. General Dynamics	3,450,463	2.86
7. United Technologies	3,087,484	2.56
8. Raytheon	2,843,316	2.35
9. Boeing	2,748,110	2.27
10. Martin Marietta	2,496,328	2.07
11. Litton Industries	2,317,691	1.92
12. Grumman	2,187,937	1.81
13. Loral	1,662,390	1.38
14. Rockwell International	1,266,643	1.05
15. Westinghouse Electric	1,238,402	1.03

Note: Rankings are based on prime contracts of $25,000 or more for the Department of Defense

The defense industrial base consists of numerous other diversified firms though restricting the analysis to 15 will enable the thesis to focus on those companies who are prime

contractors and have primary responsibility for developing and designing major systems. These fifteen companies are also representative of each of the major sectors within the defense industry, i.e., aircraft/aerospace, missiles and space, electronics, ships, and combat vehicles.

The most current data available is from 1992 and will be used throughout this thesis. This thesis does not attempt to address the myriad of potential government policies concerning the defense industrial base. Such issues include regulation of foreign investment and acquisition and increasing the reliance on private sector research and development.

D. METHODOLOGY AND LITERATURE REVIEW

This thesis broadly classifies the major defense sector strategies as expansion, diversification, globalization, and rationalization. While this list is general in nature, it provides an effective framework for classifying corporate responses. These strategies are further defined in Chapter II and individually addressed in subsequent chapters. Care was taken to distinguish between short-term tactical maneuvers, such as layoffs, plant closings, and debt reduction, and more long-term strategic maneuvers. Although industry leaders differ widely on how to best profit in the current environment, the four strategy model developed in this thesis covers each of the major approaches.

This thesis draws upon many different publications and congressional studies. In particular, the 1991 DoD Report to

Congress on the Defense Industrial Base and the 1992 Defense Conversion Commission (DCC) Report entitled Adjusting to the Drawdown help frame and guide this thesis. Extensive use was also made of DRI/McGraw Hill (DRI) publications and the United States Government Budget. DRI is the primary contributor to the DCC regarding the impacts of the current drawdown on the financial condition of the defense industrial base. The DCC was created in April 1992 "to report on the effects of the defense drawdown and make recommendations on Government programs designed for facilitating the transition to nondefense endeavors." [Ref. 1:p. 1]

Corporate responses were researched using a combination of current periodicals, investment reports, and corporate annual reports. Once the major strategies were defined, the defense companies were grouped into one or more of the four strategies. Primary and secondary strategies were identified. Trends and factors were examined to form an understanding as to why specific strategies were taken. The advantages and disadvantages of each strategy were analyzed and an evaluation was made as to the overall fit of each company to its strategy.

E. OUTLINE

The next chapter will examine the size and scope of the defense industry and its importance to the military and economic security of the United States. Topics include the defense budget, procurement spending trends, and the new

defense industrial base. The common strategies taken by the defense corporations will also be introduced prior to being outlined in subsequent chapters. Each of the strategies and factors that shaped them are then identified and evaluated. The thesis will conclude with a summary and an overall evaluation as to the fit between the strategies and the factors that led to their adoption.

II. THE CURRENT ENVIRONMENT

A. DEFENSE SPENDING

1. BUDGET TRENDS

The purpose of this section is to gain an understanding of the current defense spending environment. Defense spending has proven to be cyclical throughout the years. The defense drawdowns of the past have been reversed due to new threats of communism. Figure 1 represents the cycles that have repeated since World War II [Ref. 7:p. 4]. The Cold War is clearly the major factor in the Korean, Vietnam, and Reagan buildups.

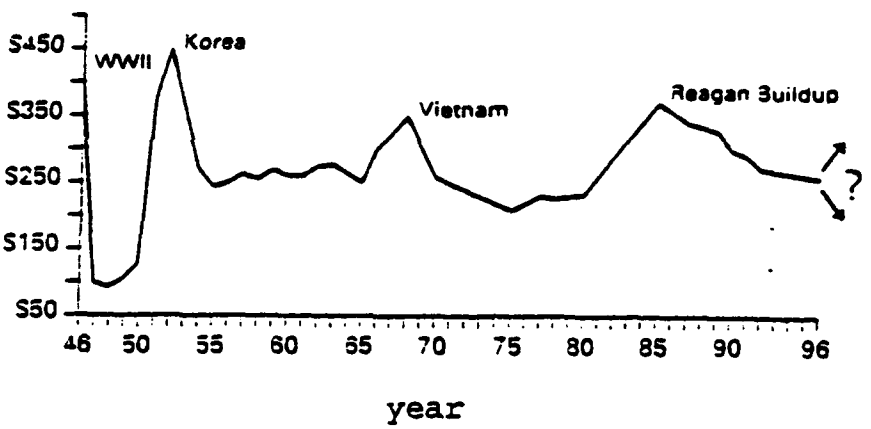


Figure 1: DoD Budget Trends Since World War II (in FY 1992 $billion)

Many analysts and industry leaders question the likelihood that defense spending will rebound once more in light of the overall defeat of communism. They are

forecasting little or no potential for future upswings. Those companies who believe this assumption are less likely to pursue growth strategies within the defense industry.

When compared to the reality of the defense budget, planning for defense spending has been categorized as overheated. Figure 2 shows projected versus actual defense spending in constant 1992 dollars. The "fingers" at the top of the chart represent various DoD five-year plans, while the continuous line represents the actual budget. The dashed line is the projected future budget. The shaded area represents actual RDT&E and procurement spending--the major revenue sources for the defense industrial base.[Ref.7:p. 2]

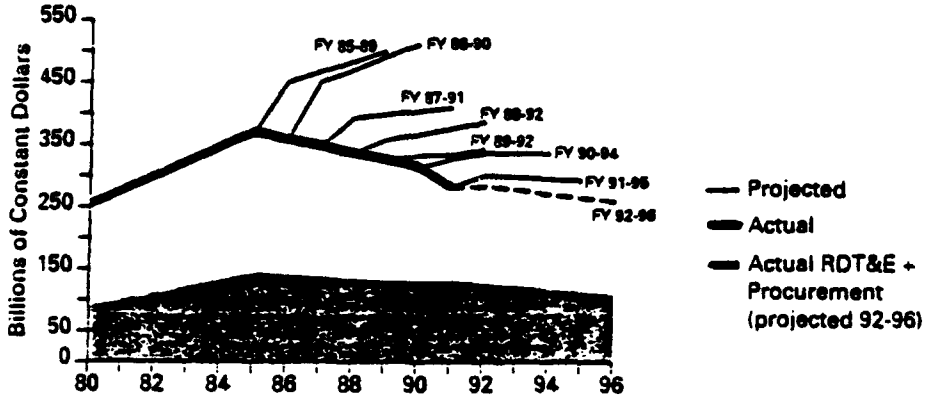


Figure 2: Actual Versus Projected DoD Budget Authority

Many of the companies in the defense sector expanded in anticipation of the projected $400-$500 billion defense budgets. The reality is that U.S. defense spending has already contracted by over 22 percent in real terms since 1986 and is expected to be down nearly 54 percent by 1997 [Ref.

8:p. 16]. This has left many companies within the defense industry burdened with excess capacity.

A better indicator of the new defense spending environment is shown in Figure 3 [Ref. 9:p. 449]. The percent real change in defense budget authority from the previous year's budget authority is plotted, using zero as the basis. The chart indicates that between 1985 and 1994, the cumulative change is a 33.7 percent reduction in defense budget authority. This reduction is expected to total 41.3 percent by 1998. While the largest reductions appear to be in the past, steady spending reductions continue to be forecasted for the future.

The current reduction in defense spending is actually the mildest and most gradual in a half century. Table 2 helps place the current drawdown in historical context. The table presents both defense spending as a percent of gross domestic product and outlays for national defense for four different periods since World War II. The immediate post-World War II period was the most rapid drawdown in history, as defense outlays fell an average of 268.4 billion 1993 dollars per year. Many industry analysts use this chart to illustrate that the defense industrial base has rebounded even through the tougher times of the past. [Ref. 10:p. 10]

Note: Excludes the impact of Desert Storm

Figure 3: Percent Real Change in Defense Spending Authority

TABLE II: COMPARISON OF PREVIOUS AND CURRENT DRAWDOWNS

Defense Spending as a Percent of Gross Domestic Product

Era	Peak		Low Point		Difference		Average Change Per Year (Percentage)
	Year	GDP %	Year	GDP %	Years	GDP %	
WW II	1944	39.3	1948	3.7	4	35.6	8.90
Korea	1953	14.5	1956	10.2	3	4.3	1.43
Vietnam	1968	9.6	1978	4.8	10	4.8	0.48
Current	1986	6.5	1997	3.6	11	2.9	0.26

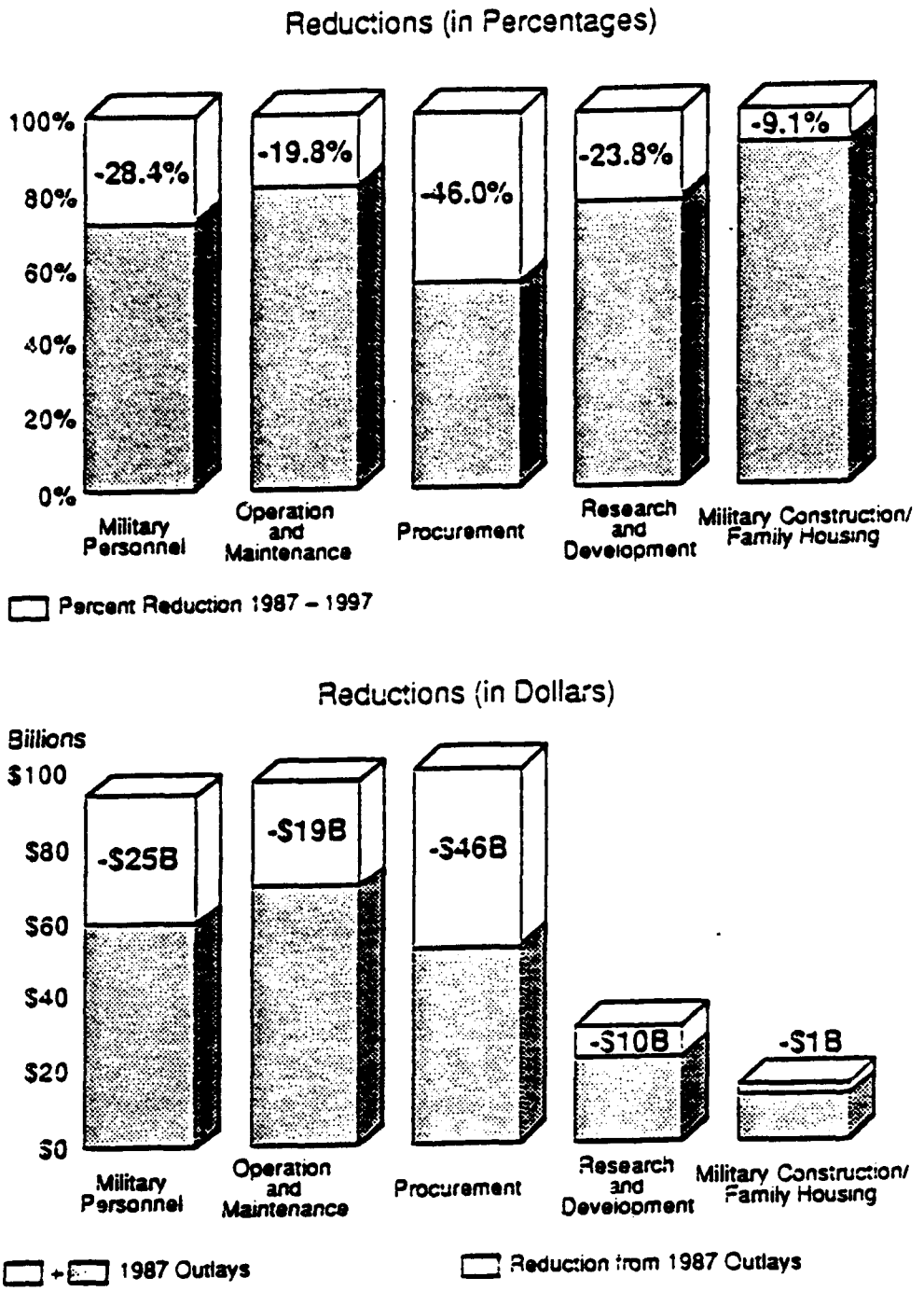
Outlays for National Defense (billions of 1993 dollars)

Era	Peak		Low Point		Difference		Average Change Per Year (Outlays)
	Year	Outlays	Year	Outlays	Years	Outlays	
WW II	1945	885.7	1948	80.4	3	805.3	268.4
Korea	1953	390.7	1956	284.5	3	106.2	35.4
Vietnam	1968	371.2	1977	219.1	9	152.1	16.9
Current	1989	353.6	1997	256.9	8	96.7	12.1

Note: Includes all national defense spending, including Department of Energy defense activities

Source: Logistics Management Institute, From War to Peace: History of Past Conversions, January 1993. Also, Budget of the United States Government, FY 1993, Supplement, February 1992.

Figure 4 breaks out the specific reductions in outlays by spending category from 1987 to 1997. Procurement and Research, Development, Test and Evaluation (RDT&E), major sources of revenue for the defense industry, are taking substantial reductions. Combined, the two take $56 billion out of a total $101 billion in cuts, or 56 percent of the total for this time period. Procurement outlays will be the hardest hit--falling 46 percent or $46 billion since 1987. The next section of this thesis continues the analysis of the new environment by examining procurement trends more closely. [Ref. 1:p. 8]



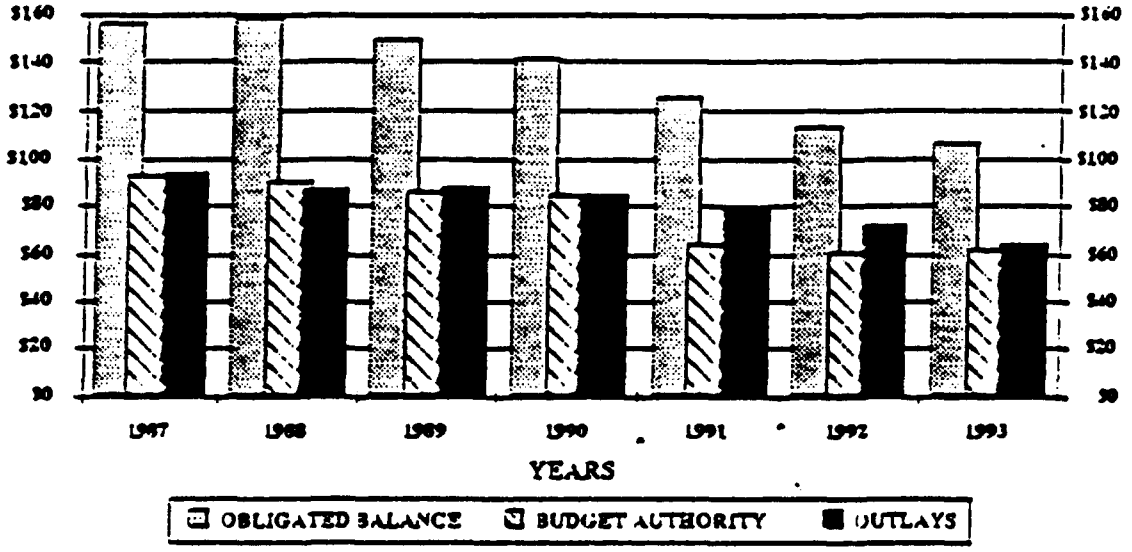
Source: Logistics Management Institute Report, The DoD Drawdown: Planned Spending and Employment Cuts, January 1993.

Figure 4: Reductions in Outlays by Spending Category 1987 to 1997

2. Procurement and RDT&E Spending Trends

The component of defense spending that most directly affects the defense industrial base is procurement. DoD procurement falls into three categories: weapon systems, dual-use items that have both defense and commercial applications, and commercial items such as office and medical supplies, and food and clothing [Ref. 10:p. 6]. While procurement accounted for nearly 30 percent of defense outlays in FY 1987, it is projected to decline to 25 percent by FY 1994 [Ref. 2:p. 2-2].

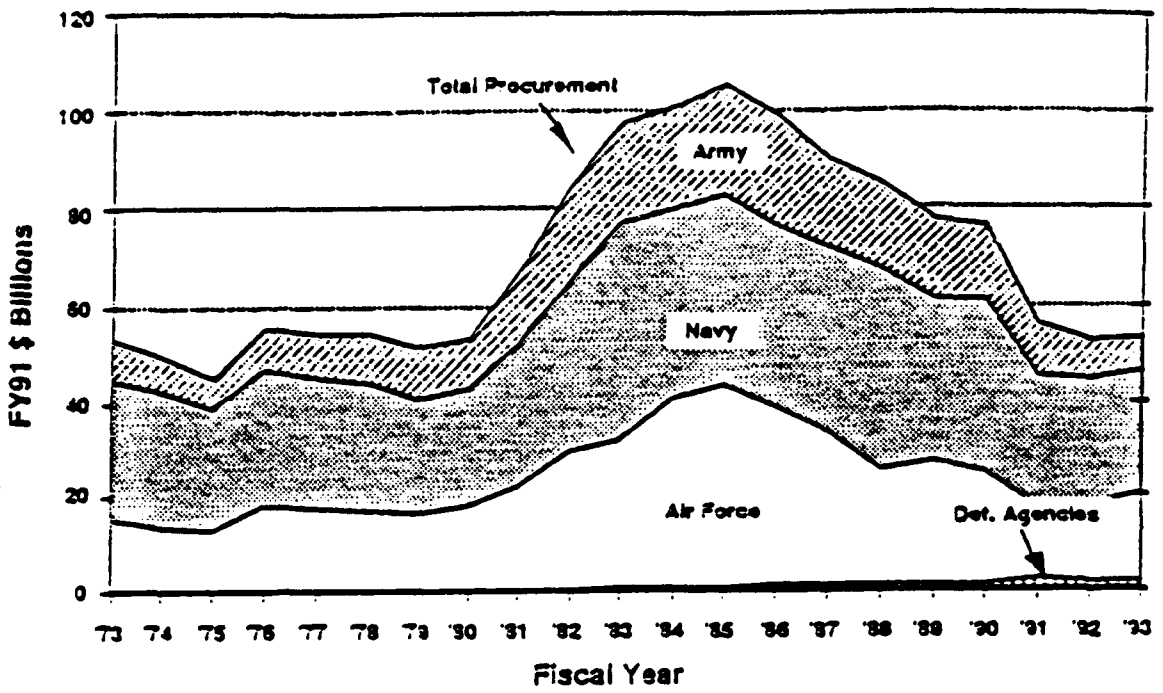
Figure 5 provides a short-term perspective on DoD procurement spending. This chart compares levels of spending for procurement in the 1990s to peak mid-1980 levels. The critical component of this chart is the declining obligated balance or backlog. Obligated balances are the cushion that will soften the impact of procurement declines for defense contractors. This is especially critical in such industries as shipbuilding and combat vehicles which are heavily dependent upon defense sales. The shipbuilding backlog is expected to maintain current operating levels for several years. These backlogs give defense companies time to strengthen their financial situation, seek alternative sources of revenues, and further refine their strategies. [Ref. 2:p. 2-3]



Source: Budget of the U.S. Government, FY 1993.

Figure 5: DoD Procurement Spending

Figure 6 displays DoD procurement trends over a 20 year period. Projected procurement spending will be maintained at roughly the same levels or slightly below those experienced in the 1970s. All of the services will see their procurement budgets cut in half from peak 1985 levels. This decline in procurement will hamper the defense industrial base in its ability to maintain high technology products, support current systems, and meet surge production. [Ref. 2:p. ES-3]



Source: Actual Data (historic) and President's budget for FY1992 (projections)

Figure 6: DoD Procurement Trends--Total Obligational Authority

Figure 7 summarizes the percent reduction in major procurement categories since 1988 [Ref. 2:p. 2-4]. The data indicates that all categories of procurement will be reduced, with combat vehicles being hit the hardest. Several of the companies examined in this thesis have a presence in the combat vehicles sector. Appendices A through D provide more detailed data on procurement trends for four programs: aircraft, missiles and space, shipbuilding, and Army weapons and tracked combat vehicles.

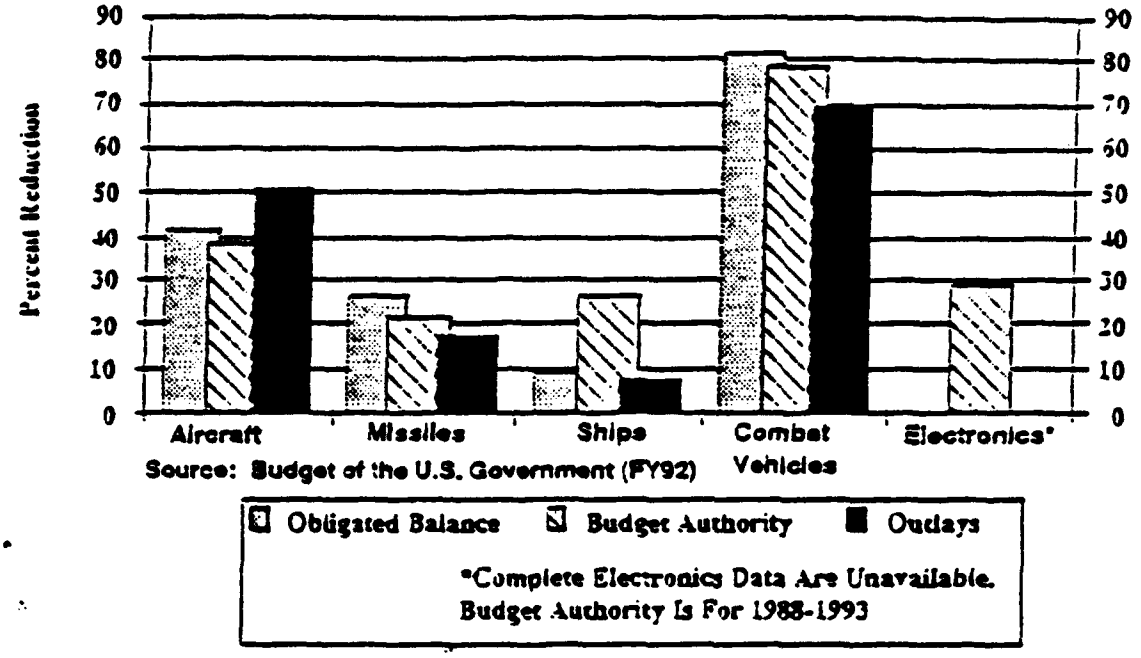


Figure 7: Budget Reductions in Major Procurement Categories

The second major component of defense spending that impacts the defense industrial base is RDT&E. DoD spending in RDT&E has been critical in maintaining American technological advantages, developing new technology, and sharpening the skills of the American worker. Many of the companies evaluated in this thesis participate in critical technology areas such as semiconductors, radars, passive sensors, and propulsion. Since 1985, RDT&E budget authority has steadily increased from $31,327 million 1993 dollars to $38,813 million in FY1993 [Ref. 11: p.78]. A significant amount of money continues to be put into such programs as the F-22, F/A-18E/F, and the MILSTAR satellite. It is anticipated that DoD will continue to support such levels of spending.

The spending trends just examined play a critical role in shaping the various corporate responses to the new environment. As this spending trend continues, DoD is struggling to determine the appropriate level and kind of support it will provide to sustain the defense industrial base. Regardless of the DoD policy, what this austere spending environment is producing is a new defense industrial base--which is the focus of the next section.

B. THE NEW DEFENSE INDUSTRIAL BASE

Due to the historic cyclical nature of defense spending, the contraction of the defense industrial base has not surprised everyone. Others are more concerned. Although the world is much different today than during the years of the Reagan defense build-up, the United States continues to be called upon for world leadership. Although this defense builddown is small by historical standards, it comes at a time when our economy is not growing as rapidly as it was during earlier cutbacks. Combined with stiffer competition from abroad, the new defense industrial base must respond differently.

At its height, the business of national defense employed 6.7 million people--5.6 percent of the labor force. Since 1989, 440,000 defense industry workers have been laid off, as well as 300,000 soldiers, sailors, and airmen, and 100,000 DoD employees. This far exceeds the combined cutbacks at GM, IBM, AT&T, and Sears over the same period. A Federal Reserve study

estimates that layoffs between 1987 and 1997 could total 2.6 million. [Ref. 3:p. 84]

What has developed is a period of economic Darwinism. The defense industry is undergoing a dynamic period of consolidation and restructuring. Today, a dozen companies compete in more than six defense market segments, from aircraft to combat vehicles. Tomorrow they will be forced to concentrate on two or three segments. In 1992 there were 13 and 16 companies competing in the space and avionics segments, respectively. DRI is predicting consolidation to five or six companies in each group by the end of the decade. [Ref. 10:p. 31] Analysts at Booz, Allen, and Hamilton estimate that 75 to 85 percent of the top 100 defense companies or divisions that remain could be gone by the year 2000 [Ref. 4:p. 94].

Combined with a seven percent national unemployment rate and a sluggish global economy, the military drawdown exacerbates recession, hampers recovery, and weakens the balance sheets of defense companies. The Americans for Democratic Action, a Washington D.C.-based think-tank, and the AFL-CIO are urging Congress to spend more money creating jobs for displaced workers and new markets for defense contractors. In addition, the Deputy Assistant Secretary of Defense has been tasked with developing a coherent approach to preserving the defense industrial base. His efforts range from prioritizing weapons systems to reviewing military specifications. [Ref. 12: p. 31]

The primary DoD approach to the new environment is to let market forces prevail. This policy has its roots in the Reagan and Bush Administration. The 1991 Economic Report to the President, written by Bush's Council of Economic Advisers and sent to Congress in February 1991, reads, "The U.S. economy has had little trouble bouncing back from sharp declines in defense spending and any efforts to protect companies from market forces would restrain the economy's natural evolution." [Ref. 13: p. 4] The report cited the years 1944-47, when defense spending fell from 41 percent of GNP to 4 percent, as an example of successful adjustment.

Proponents of this view believe that current cuts in defense spending levels are not dangerous to the economy. These analysts note that $190 billion is scheduled to be spent on RDT&E between FY1993 and FY1997 (14 percent of the DoD budget) and procurement expenditures during the same period are projected to total more than $300 billion (22 percent of the DoD budget) [Ref. 14:p. 48].

This approach is not without its critics, namely those executives and managers within the major defense corporations. Bernard Schwartz, Chairman and CEO of Loral Corporation, the leading defense electronics firm, seems to echo the sentiments of others in the defense industry. He states that, "Free market restructuring is often motivated by profit...with little regard for long-term investment, or performance, or serving the country's national security needs." [Ref. 15:p. 1]

Others worry about the ability of industry to reconstitute such critical technologies as nuclear propulsion in times of national crisis. In general, critics of the free market approach argue that American security is at risk as a result of the current drawdown in defense spending and its impact on the defense industry.

Recently, the Clinton Administration has shown signs of rejecting the past laissez-faire approach to the defense industry. President Clinton's industrial policy proposes helping certain defense contractors and easing antitrust regulation of defense contractors [Ref. 16:p. D1]. The recent recommendation, subject to approval by Congress, to build a third Seawolf submarine is an example of such a policy. General Dynamics' Electric Boat division is clearly the beneficiary of such a recommendation.

However, critics argue that bureaucrats should not and cannot "pick winners and losers" in industry. These critics want market forces, not the government, to guide conversion and consolidation within the defense industry. Regardless of the extent of involvement by the government, the new defense industrial base will be smaller as it continues its path through this dynamic time period. [Ref. 16:p. D1]

Al Hanna, Director of the Management Consulting Firm McKinsey and Company, Inc., Stamford, Connecticut, stated, "As companies in the industry struggle to survive, all of them will be either unprofitable on an outright basis or achieve

returns on capital too low to make them viable." [Ref. 13:p. 86] Since those comments in 1991, the defense industry has proved him wrong. Why? These companies have reengineered, streamlined operations, and developed successful strategies for guiding them through the new environment. The following section provides an introduction into the strategies employed by the new defense industrial base.

C. CORPORATE STRATEGIES

The companies within the defense sector have set goals such as improving operating margins, increasing shareholder value, and positioning for economic recovery. Short-term tactical decisions such as layoffs, reducing capital expenditures, and reducing debt are efforts to meet these goals. However, the success or failure of these companies is dependent on more long-term strategic decisions. Throughout the remaining chapters of this thesis, a strategic matrix developed by General Dynamics will be used to analyze these strategies.

The matrix is shown in Figure 8 and guides decisions regarding strategy and product line investment. On the horizontal axis is the competitive position of the business, while the vertical axis measures the attractiveness of its market. William Anders, Chairman and CEO of General Dynamics, describes competitive advantage as low costs, good experience, and leading technology. It is a subjective measure relative to the competition. Market attractiveness includes such

factors as market growth, potential profit margins, and risks. Each band within the matrix suggests how to invest and manage a business. [Ref. 7:p. 8]

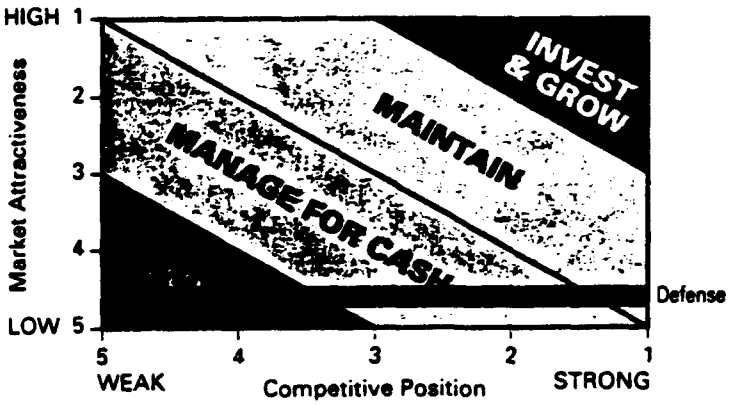


Figure 8: The General Dynamics Strategic Matrix

According to Anders, defense ranks low in terms of market attractiveness. However, the competitive position and opportunity to compensate for reduced military business vary not only from defense sector to defense sector, but from company to company. The matrix indicates that only the strongest defense companies should maintain their current investment in defense and none should expand.

The model in this thesis stipulates four corporate strategies: expansion, diversification, globalization, and rationalization. These strategies are represented by various points on the matrix. The expansion strategy is represented as the invest and grow portion of Anders' matrix. Diversification is the most common strategy and is a variation of the invest and grow approach. Companies which follow this

strategy expand into new commercial markets which are predicted to grow in order to replace lost DoD revenues. Alternatively, defense companies can maintain their current defense position by globalizing or increasing exports to replace lost DoD sales. Finally, managing for cash reflects reduction of a company's businesses through a strategy of rationalizing, or divesting non-core businesses. Although exiting the market completely is an option, government policies and procurement regulations tend to inhibit this option, especially for the larger defense companies.

Several companies are pursuing a policy of expansion. These companies believe in the cyclical nature of military spending and are betting that by acquiring a larger stake in key defense businesses now they will become dominant players later. This strategy is particularly attractive to smaller electronics and avionics companies whose components are critical to the Pentagon's strategy of modernization. Loral and Martin Marietta are the industry leaders in this strategy. Since 1987, Loral has spent $1.8 billion buying six high-tech military electronics businesses, including Ford Aerospace and LTV's missile division. In November 1992, Martin Marietta acquired General Electric's aerospace business, which generated over $6 billion in sales in 1992. [Ref. 3:p. 95]

Diversification, or evolution into nondefense businesses, is the strategy favored by most defense companies and is also promoted by Congress. Many companies are moving in this

direction and attempting to take advantage of their comparative advantage in similar commerical markets. For example, Martin Marietta hopes to get 50 percent of its revenues from nondefense businesses by 1997 and has been moving into postal sorting machines, environmental robotics, construction materials, and rock quarries. Northrop recently developed a commercial aircraft division. It bought a 49 percent stake in Vought, a maker of civilian and military aircraft structures, from LTV Corporation for $47 million. General Motors - Hughes Electronics is also pursuing such a strategy. By 1994 it will have invested $500 million in the HS601 satellite, a direct broadcasting service which will compete with cable television. [Ref. 4:p. 99]

The third major strategy is globalization. As domestic spending decreases, more corporations are turning to foreign military sales. The United States share of the world market and volume of arms sales continues to rise. In 1992, the U.S. exported $13.6 billion in arms to the developing world, or 3 1/2 times its closest competitor--France. This amount is 136 times the amount exported by China. The U.S. accounted for 57 percent of all sales to the developing world in 1992. [Ref. 17:p. 10]

While most corporations are pursuing this strategy to a certain extent, United Technologies (UT) has pursued this avenue most aggressively. UT's Pratt and Whitney Division was selected to supply Taiwan with $500 million worth of F100-PW-

220 engines for F-16A/B fighter jets, and is competing for another order worth approximately $600 million for engine to power F-15s for Saudi Arabia [Ref. 18:p. 3].

General Dynamics is following a strategy that Chairman and Chief Executive Officer William Anders calls rationalization. It is a combination of downsizing and consolidating. He defends his strategy as one of "managing for cash" vice liquidation. Anders does not believe the cyclical upswing in defense spending will return and is concentrating only on his businesses' core competencies. Anders also refers to his policy as "rightsizing". Since 1991, General Dynamics has sold off nearly $3 billion of its assets, including its prized tactical air division in Fort Worth. [Ref. 4:p. 94]

Conversion to flexible production lines is a strategy that will become part of nearly all corporate cultures and is therefore not treated as a separate category. The future of defense spending is in limited production runs of customized items that are more responsive to the Pentagon's needs. This requires flexibility by the defense sector. Fewer numbers will be ordered of more technologically advanced items. Daniel Pinick, President of Boeing's Defense Division states:

> Conversion won't be to new products. It will be conversion from rigid hard-tool production lines to soft-tooled, flexible machines and agile teams that can build more than one thing without facility changes. [Ref. 3:p. 96]

Flexible manufacturing is intended to reduce current trends in increasing unit costs, lengthening lead times, and program delays. It is intended to improve product design, reduce inventories, smooth the manufacturing process, and shorten turnaround times. Efficiency, flexibility, and cost cutting are the keys to future success within the industry. [Ref. 2:p. 5-2]

Some companies will pursue more than one of the four strategies discussed above and different divisions within a company may lie at different points in the General Dynamics matrix. However, each company within the defense industrial base is guided by a primary strategy, while the others are secondary in size and scope. While no one single strategy is necessarily correct, the strategy chosen by the company must be consistent with the underlying factors that have shaped the company, its current market position, and its corporate culture. The remainder of this thesis will look at each of the strategies and the factors that are molding the development and execution of these strategies by the top defense companies in the United States.

III. EXPANSION--IN SEARCH OF MARKET SHARE

A. FUNDAMENTALS OF THE EXPANSION STRATEGY

Many of the companies in the defense sector believe in the cyclical nature of military spending and are betting that by acquiring a larger stake in key defense businesses now they will become dominant players later. Expansion enables companies to capitalize on their current strengths and core defense capabilities. An important element in the process of consolidation within the defense industry, expansion is the complementary strategy of downsizing. This chapter of the thesis will outline the basic elements of the strategy, its advantages, and the barriers to implementation. Succeeding sections will focus on the companies that are pursuing the expansion strategy and the factors that guided management's decision to pursue such a strategy.

William Anders states that, "Beyond a few niches, in general there are no real 'Invest & Grow' opportunities in defense." [Ref. 7:p. 8] Given the general unattractiveness of the defense market, Figure 9 rejects expansion within the defense industry [Ref. 7:p. 8]. However, according to JSA International, a consulting firm in Cambridge, Massachusetts, 259 defense contractors have sold out to stronger or better positioned rivals since 1985 [Ref. 4:p.94]. As this chapter will illustrate, there are areas within the defense industry

where expansion is and will continue to be an intelligent strategy.

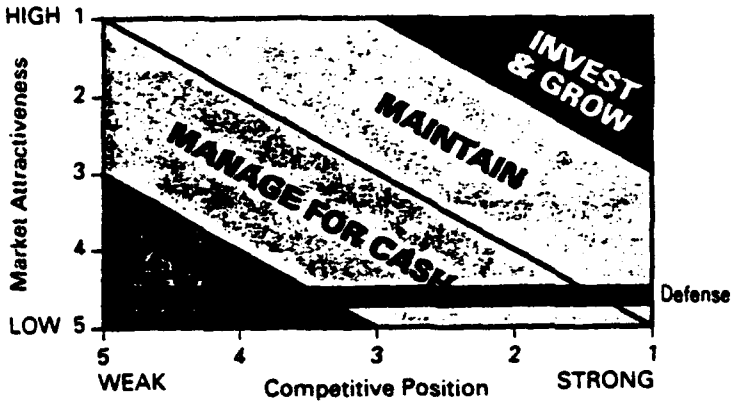


Figure 9: The General Dynamics Strategic Matrix

Martin Marietta Chairman and Chief Executive Officer, Norman Augustine, is a strong proponent of the expansion strategy and believes the current drawdown is not permanent. Given the difficult environment facing the defense industry today, he wants a company whose management is totally focused on defense. In today's environment, defense companies must share pieces of a shrinking pie. Augustine wants to buy bigger pieces. Addressing the issue of corporate acquisitions, he skeptically states:

> There is good news and bad news. The bad news is that 75 percent of all acquisitions fail. The good news is that 20 percent don't make any difference at all. [Ref. 19:p. 23]

Why is this strategy even considered, given the current market conditions and past failures? Consolidation is not an option but a requirement in mature industries such as defense.

Margaret Blair, a research associate and economist at the Brookings Institute, says that takeovers, mergers, and consolidation occur when an industry nears the end of a growth cycle. She writes:

> Very often, takeovers are an institutional mechanism for achieving consolidation when consolidation is needed. The signal that consolidation is needed is that there is not enough growth, not enough profits to go around for the industry to sustain all companies. [Ref. 20:p. 44]

Assuming the company survives the downturn in defense spending, an effective strategy will enable the company to strengthen and improve its competitive advantage. William Anders outlines the major advantages of expansion as rightsizing, repositioning, and restructuring. Rightsizing increases the efficiency of the company by reducing internal excess capacity. Repositioning puts resources where they can be efficiently used and eliminates costly and duplicate R&D efforts. Restructuring increases the financial strength of the company. [Ref. 7:p. 10]

As the number of mergers and acquisitions increases, fears of losing plant capacity and production capability, as well as reducing the level of competition, have triggered political interest. Reduced competition has sparked fears of monopolies and higher prices. However, Thomas L. McNaughter, a fellow at Brookings Institute, argues that excessive competition within the defense industry is not always good and that an expansion strategy can actually be beneficial. Since only one competitor will win a contract, additional competitors will be

forced to reduce their investment since their chances of winning are decreased. He maintains that limiting competition maintains high levels of investment and sustains the high degree of innovation. [Ref. 20:p. 46]

Antitrust laws within the United States regulate the level of competition within industry. Last year's rejection of the proposed merging of two financially troubled armored vehicle-makers, Alliant Techsystems, Inc. and Olin Corporation, was a major setback for proponents of the expansion strategy. However, recent initiatives point towards an easing of antitrust enforcement against the defense industry. Secretary of Defense Les Aspin wants to encourage mergers and acquisitions so defense companies can focus on core operations and reduce costs, thus saving the government money. [Ref. 16:p. D1]

Contrary to Aspin's desires, the Clinton Administration is reversing a decade-long Republican easing of antitrust laws. The traditional Democratic school believes that government should take an active role in protecting the American consumer. Under Presidents Reagan and Bush, the market was believed to control would-be monopolists. However, a new school of thought is developing. Charles Rule, a former Reagan antitrust chief, states, "...[the new faction] believes antitrust laws often prevent good market arrangements and various beneficial forms of cooperation." [Ref. 21:p. 1] Anne Bingaman, assistant Attorney General for Antitrust under

President Clinton, has publicly stated her opposition to antitrust exemptions [Ref. 16:p. D1].

As the government searches for an official position on the issue, defense companies continue to acquire and merge with new business units and companies. The next section of the thesis will highlight the most significant events within the industry with regards to expansion. The final section will examine the factors that shaped the strategy.

B. DEFENSE COMPANIES IN PURSUIT OF EXPANSION

Table III provides a list of those companies pursuing an expansion strategy. General Motors - Hughes Electronics, Lockheed, Loral, and Martin Marietta are pursuing expansion as their primary strategy in adapting to the new defense spending environment. Litton Industries and Raytheon are following a strategy of expansion to a more limited degree, relying primarily upon diversification into commercial markets.

TABLE III: DEFENSE COMPANIES PURSUING AN EXPANSION STRATEGY

Expansion Strategy	
Primary	Secondary
GM-Hughes Electronics Lockheed Loral Martin Marietta	Litton Industries Raytheon

1. GM-Hughes Electronics

General Motors (GM) is not only the world's largest automobile manufacturer, it is also one of the nation's leading producers of defense products. Substantially all of GM's defense business is conducted by GM-Hughes Electronics Corporation, a wholly-owned subsidiary of GM, that includes the Hughes Aircraft Company. The 1992 acquisition of General Dynamics' missile division for $450 million makes GM-Hughes Electronics one of the nation's premier missile builders, along with Raytheon. Currently consolidated into GM-Hughes Electronics' Tucson, Arizona facility, the acquisition exploits the company's strengths in missile and guidance system production. The company has also announced that it is negotiating with McDonnell Douglas concerning the purchase of its missile division. [Ref. 22:p. 2] GM-Hughes Electronics is currently the nation's largest defense electronics contractor and is continuing to expand its market share.

2. Lockheed

For more than 30 years Lockheed has been a provider of space, missile, surveillance, and communications systems to the Department of Defense. The $1.5 billion acquisition of General Dynamics' Fort Worth Division, producer of tactical fighter aircraft including the F-16, creates a $6.5 billion a year aeronautical business--making Lockheed one of the world's premier military aircraft producers [Ref. 23:p. 6]. The new company is called Lockheed Fort Worth and includes General

Dynamics' one-third share in the F-22 program; the F-16 fighter program (which has a $6 billion backlog); the FS-X (a joint venture between Japan and the U.S. to develop an F-16 derivative); various other military electronics and special programs; and excludes any liabilities that may result from Fort Worth's aborted A-12 attack bomber program [Ref. 23:p. 18].

The acquisition is expected to increase the efficiencies of Lockheed's troubled F-22 program by optimizing the utilization of the company's resources. The F-16 program, a favorite of foreign governments, also positions the company well for further expansion in the international market. The acquisition is estimated to add $.25 to this year's earnings per share and upwards of $.50 in subsequent years [Ref. 24:p. 566].

3. Loral

A high-tech defense electronics firm, Loral has been the leader in the expansion strategy with several major acquisitions in recent years. The acquisition of Goodyear Aerospace from Goodyear Tire and Rubber in 1987, Time Microwave in 1990, and the advanced simulator business of Bolt Beranek and Newman, Inc. in 1993, all strengthened Loral's market share in electronics. The biggest developments were the 1990 acquisition of Ford Aerospace from the Ford Motor Company and the 1992 acquisition of LTV Corporation's missile business. Both acquisitions position the company well to

rival the strength of GM-Hughes Electronics in the electronics sector.

Effective October 1, 1990, Loral Aerospace Holdings, Inc. ("Loral Aerospace"), a corporation jointly owned by Loral Corporation and the Merchant Banking Partnership affiliated with Shearson Lehman Brothers Holdings, Inc., acquired Ford Aerospace from the Ford Motor Company. At the completion of the initial agreement, Loral owned 51.5 percent and the Merchant Banking Partnership 48.5 percent. In June 1992, Loral agreed to buy the Merchant Banking remaining equity in Loral Aerospace. This transaction gives Loral complete ownership of all the businesses acquired from Ford Motor Company, with the exception of Space Systems/Loral, a Loral Aerospace subsidiary, in which the partnership will continue to be an equity partner. [Ref. 25:pp. 6,32]

In an effort to better position itself for further acquisitions, Loral restructured its debt in 1992. Loral paid off $100 million of debt due in 2010 and replaced it with $300 million of new long-term debt at favorable interest rates. The company also increased its revolving bank line to $600 million. These adjustments take advantage of favorable market conditions by cutting its borrowing costs and providing more credit for future growth and expansion. Chairman and Chief Executive Officer Bernard Schwartz estimates that the debt restructuring will add five cents to their earnings per share in 1993. [Ref. 26:p. 38]

4. Martin Marietta

A diversified defense and commercial products company, Martin Marietta's "Peace Dividend Strategy" calls for "expanding our defense business by capitalizing on areas of technological leadership and playing an active role in the current period of industry consolidation." [Ref. 27:p. 3] In the past several years, Martin Marietta has looked at as many as 100 companies to come up with a list of six to eight possible acquisitions for further consideration [Ref. 28:p. 32]. In October 1993, Martin Marietta agreed to buy General Dynamics' space business

In early 1992, Martin Marietta was outbid by Loral in the acquisition of LTV Corporation's missile division. In November 1992, Martin Marietta announced a $3.5 billion merger with General Electric Aerospace (GE Aerospace)--the largest merger of the post-Cold War era. Approved in April 1993, the Martin Marietta-GE Aerospace merger is referred to as "a milestone--or a catalyst that will drive the industry further into consolidation." [Ref. 29:p. 23] The merger enables Martin Marietta to better compete with Loral and Lockheed, major competitors in the satellite and defense electronics segments. GE received $2.05 billion in cash and an additional $1 billion in new convertible preferred stock, as well as two seats on Martin Marietta's board of directors [Ref. 29:p. 23]. GE Aerospace is a world-class developer of such products as spacecraft, radar and sonar systems, communication systems,

simulation systems, fire control systems, missile system components, and automated test systems.

5. Litton Industries and Raytheon

Although secondary to their principal strategy of diversifying into commercial markets, Litton Industries and Raytheon are also pursuing a limited expansion strategy. The 1991 acquisition of General Instrument's Defense Systems Group enhanced Litton's position in the defense electronics market. Raytheon also strengthened its position in the electronics market with purchases of Applied Remote Technology from General Dynamics in 1993 and AMBER Engineering, Inc. in 1992. Applied Remote Technology is a supplier of advanced unmanned underwater vehicles and sensor systems, and AMBER designs and produces a wide variety of infrared components and focal plane arrays [Ref. 30:p. 6].

Although the General Dynamics strategic matrix suggested that expansion was not an appropriate strategy for defense companies, it is clear that several defense companies are aggressively pursuing such an option. Although not intended to be all inclusive, Table IV provides a summary of the major expansion highlights. The next section will examine the factors that have shaped the evolution of the expansion strategy.

TABLE IV: DEFENSE INDUSTRY EXPANSION HIGHLIGHTS

General Motors-Hughes Electronics
1993: -Begins talks with McDonnell Douglas concerning potential purchase of missile division 1992: -Acquires General Dynamics' missile division 1989: -Acquires the Electro-Optics division of the Perkin-Elmer Corporation
Litton Industries
1992: -Acquires GI's defense systems group
Lockheed
1993: -Acquires General Dynamics' fighter plane division 1992: -Bids for LTV Corporation's missile division 1991: -Acquires M.E.L. Defense Systems Ltd from Phillips Electronics Ltd
Loral Corporation
1993: -Acquires the advanced simulator business of Bolt Beranek & Newman, Inc. 1992: -Acquires LTV Corporation's missile business -Acquires Librascope Corporation and Loral Sonar Systems Corporation -Purchases remaining 41% equity in Loral Aerospace (formerly Ford Aerospace) -Restructures debt to gain flexibility for future expansion 1990: -Acquires Ford Aerospace from Ford Motor Company 1989: -Acquires Electro-Optics Division of Honeywell,Inc. 1987: -Acquires Goodyear Aerospace from Goodyear Tire & Rubber
Martin Marietta
1993: -Agrees to buy General Dynamics' space business -Merges with GE Aerospace 1992: -Bids for LTV Corporation's missile division
Raytheon
1993: -Acquires Applied Remote Technology 1992: -Acquires AMBER Engineering, Inc.

Source: Wall Street Journal Index

C. FACTORS SHAPING STRATEGY SELECTION

The purpose of this section is to analyze the factors that have shaped the expansion strategy within the defense sector. These factors are illustrated in the flowchart in Figure 10. After considering the company's exposure to defense spending, the company must evaluate the market segment or niche within which the company operates, the compatibility or synergism that the new unit or business has with the existing technology and assets, and the company's financial strength. Although certain factors will indicate whether a company should or can expand, the interaction of all factors is the final determinant in strategy selection.

1. Exposure to Defense Spending

In formulating the corporate strategy, the defense company must first consider its current exposure to defense spending. The companies that are highly exposed to defense spending are likely to further expand. Companies with more exposure are oriented towards government unique accounting practices, standards and specifications, and audit and oversight roles, thus making their strategy selection less flexible. The less the exposure to defense spending, the easier it is for companies to offset lost defense revenues or exit the defense market completely.

Table V lists the top DoD contractors based on 1991 defense and space revenues as a percentage of total revenues [Ref. 10:p. 60]. Of the eleven companies in the extremely

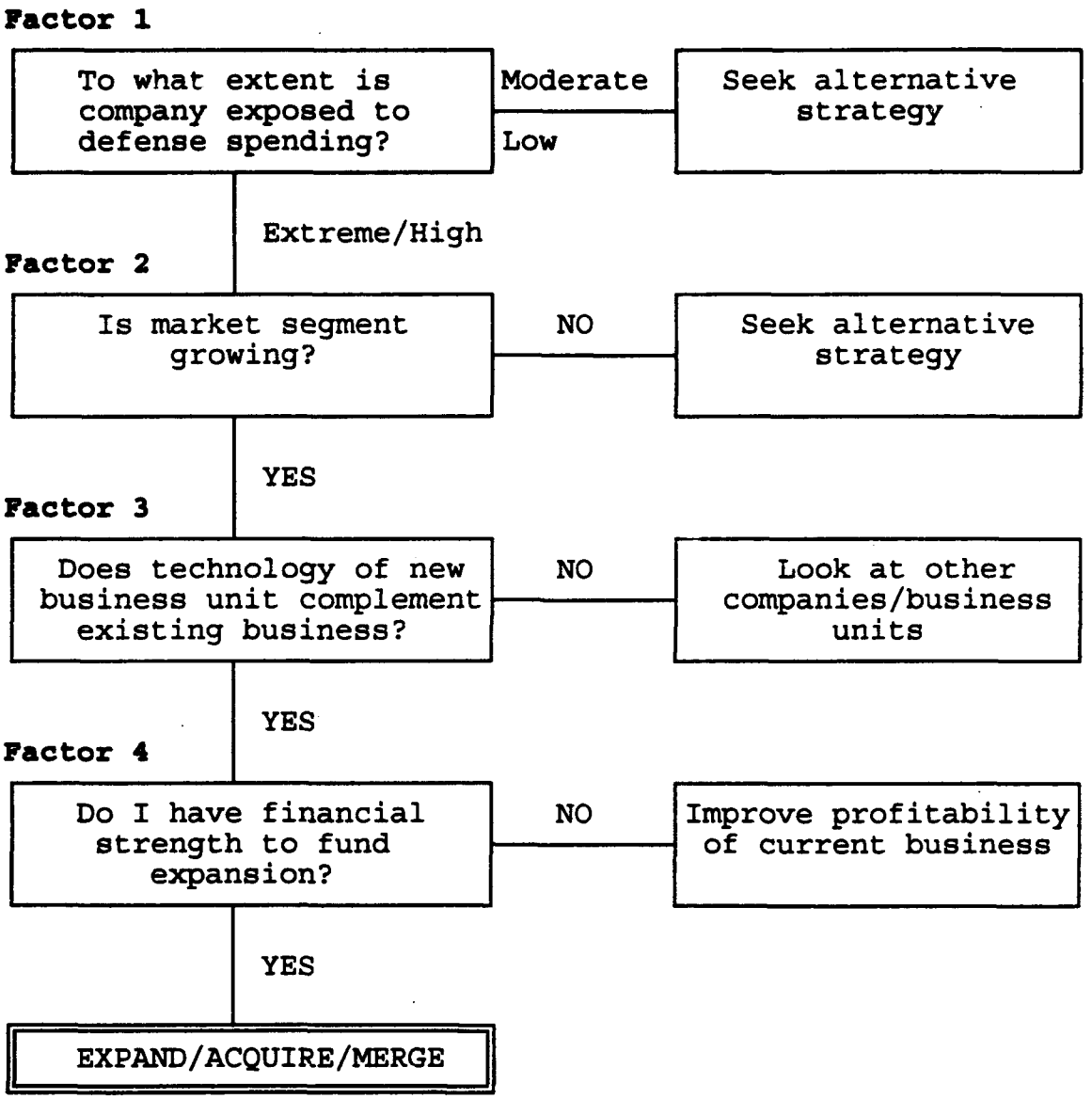


Figure 10: Factors Framing the Expansion Strategy

or highly exposed categories, six have actively pursued an expansion strategy. Those companies which are more modestly exposed are pursuing alternative strategies.

TABLE V: EXPOSURE TO DEFENSE SPENDING

Company	Percent	Category
Grumman	90.8	Extremely Exposed
Northrop	89.6	
Martin Marietta	85.6	
Lockheed	85.0	
General Dynamics	84.6	
Loral	75.3	
McDonnell Douglas	55.1	Highly Exposed
Raytheon	53.9	
GM-Hughes Electronics	49.6	
Litton Industries	46.9	
Rockwell	43.6	
United Technologies	25.9	Moderately Exposed
Westinghouse Electric	25.4	
Boeing	19.9	
General Electric	12.3	Minimally Exposed

Note: Percent = 1991 defense and space revenues as a percentage of total revenues

Source: DRI/McGraw-Hill

Despite being extremely exposed to defense spending, Grumman and General Dynamics are both downsizing. Facing declining aerospace revenues and mature defense programs, Grumman will focus on cash generation and its defense electronics business. General Dynamics is trying to achieve critical mass in its two remaining core businesses--armored vehicles and nuclear submarines. Northrop and Boeing are the only manufacturers producing strategic bombers in the United States and both face a shrinking defense market. Facing

severe cutbacks in its B-2 production, Northrop is pursuing diversification into commercial markets.

Exposure to defense spending is a key factor in the strategic decision-making process. Those companies with higher exposure are more likely to expand, assuming the remaining factors also fit. However, as seen in the case of Grumman, General Dynamics, and Northrop, the market sector the company participates in is of even greater importance.

2. Market Sector Growth Opportunities

Companies must also determine whether the markets they participate in offer sufficient opportunities for future revenue growth. Companies whose strengths are in these growth markets are more inclined to expand their defense exposure. Based on the Pentagon's September 1993 five-year defense plan, the emphasis will not be on new weapons platforms, but in the upgrading and modification of existing platforms. This emphasis creates market niches that include precision ammunitions and electronic, avionic, and communication gear. [Ref. 12:p. 94]

In October 1992, then Governor Clinton also pledged his support for products that are mobile and technologically superior. He emphasized programs such as electronics, fast sealift ships, and the F-22. Clinton stated:

> We will give top priority to research and development funding both to keep the edge of basic research and to produce the best weapons and equipment focused on the defense technologies of the future: sensors, surveillance, guidance, materials, communications, and intelligence. [Ref. 31:p. 10]

The defense electronics industry provides the greatest growth prospects, given this set of priorities. While procurement in the aircraft sector is expected to significantly decline, the defense electronics industry will experience a more modest decline in procurement and RDT&E spending over the next four years. The Electronics Industries Association predicts that procurement spending in the electronics and communications sector will decline by $500 million in constant dollars between FY 1993-97, compared to $3.3 billion for aircraft procurement. [Ref. 10:pp. 9-11]

Table VI provides a list of the top 15 defense companies which derive greater than 25 percent of their total revenues from business segments involved in defense electronics. Rockwell and Westinghouse Electric have both chosen to diversify into commercial markets rather than expand. Rockwell's main defense projects such as the B-1 bomber, Shuttle Orbiter, and the MX Missile are fully mature and the company sees more attractive opportunities in commercial electronics [Ref. 32:p. 58]. Westinghouse Electric has been suffering financial losses in its Westinghouse Financial Services subsidiary and does not have the financial strength to expand. As a result, Westinghouse has been concentrating on liquidating its troubled assets and improving profitability [Ref. 32:pp. 86-87].

TABLE VI: EXPOSURE TO DEFENSE ELECTRONICS ($million)

Company	Business Segment	Revenue	Percent
Loral	Defense Electronics	$2,882	100.0
Raytheon	Electronics	4,976	54.9
GM-Hughes	Defense Electronics	5,353	43.5
Rockwell	Electronics	4,620	42.3
Martin Marietta	Electronics, Information and Missiles	2,473	40.0
Litton Industries	Advanced Electronics	1,957	34.0
Westinghouse Electric	Electronic Systems	2,788	33.0

Note: Percent = 1992 business segment revenue as a percentage of total revenue

Source: 1992 Annual Reports

With the exception of Lockheed's expansion in the tactical aircraft market, most expansion is occurring in the defense electronics sector. Those companies which can take advantage of the new set of DoD priorities are participants in the electronics sector. However, expansion must also ensure new segments or business units complement existing core business capabilities.

3. Existing Core Competencies

Expansion into new market segments or merging with new business units must be done in a manner which reinforces strengths and core business capabilities. Synergism must exist to make the expansion efforts profitable and efficient. Without this compatibility, efficiencies associated with expansion are lost. The acquisitions described in this chapter all exploit current strengths of these defense companies.

Loral is the number one military training and C^3I company, deriving about 25 percent of its new contract awards in this segment. The company claims its weapons simulators and laser-based engagement systems are the focus of the "virtual battlefields of tomorrow". [Ref. 25:p. 13] Its recent acquisition of the advanced simulator business of Bolt Beranek and Newman enhances Loral's position in this area.

Similarly, Lockheed's purchase of General Dynamics' fighter plane division complements its F-117 and F-22 program. The acquisition more than doubles the size of the Aeronautical Systems Group and makes Lockheed a leader in worldwide aircraft production. Lockheed is challenging McDonnell Douglas as the nation's number one defense contractor [Ref. 23:p. 18].

Martin Marietta's acquisition of GE Aerospace merges the two leading DoD research and development contractors into a technological powerhouse. The merger will nearly double Martin Marietta's annual revenues to more than $11 billion. GE Aerospace receives 60 percent of its revenues from defense electronics, and the merger creates the world's largest defense electronics firm, surpassing GM-Hughes Electronics. [Ref. 33:pp. 84-85]

Finally, GM-Hughes Electronics' acquisition of General Dynamics' missile business makes the company a more viable industry leader in the missile systems field, which currently accounts for 30 percent of the electronics segment's revenue

[Ref. 22:p. 23]. Already producing Advanced Air-to-Air Missiles (AMRAAMs) and TOW anti-tank missiles, GM-Hughes Electronics' product line now also includes the Tomahawk sea-launched cruise missile, the Advanced Cruise Missile, the Sparrow, Standard, Stinger, and Rolling Airframe missiles, and the Phalanx shipboard anti-missile gun. GM-Hughes Electronics now rivals Raytheon as the nation's largest missile producer [Ref. 33:p. 88].

4. Financial Strength

The final factor that determines if the expansion strategy is to be pursued is the financial strength of the company. This section of the thesis will examine three measures of financial strength: current ratio, capital structure ratio, and stock performance. These measure liquidity, debt level, and investor confidence, respectively.

a. Current Ratio

The current ratio measures current assets as a multiple of current liabilities. It is a measure of liquidity which is primarily provided by cash generated from operating activities. The multiple is the number of times current assets will pay off current liabilities. Historically, a two to one multiple has been considered ideal, although this varies by industry. A multiple less than one indicates potential financial problems and a multiple in excess of five indicates too much cash on hand. [Ref. 34:p. 840]

Expansion requires companies to have the cash to finance acquisitions and capital spending. Thus, expanding companies would be expected to have liquidity, as measured by the current ratio multiple, greater than the industry average. Table VII lists the liquidity of the top 15 defense contractors for the last three years.

TABLE VII: LIQUIDITY OF MAJOR DEFENSE COMPANIES

		Current Ratio		
		1993	1992	1991
1.	**Martin Marietta**	2.95	1.71	1.41
2.	Grumman	2.42	2.43	3.88
3.	**Loral**	1.81	1.98	1.64
4.	**Raytheon**	1.78	1.77	1.38
5.	General Dynamics	1.65	1.88	1.39
6.	Rockwell	1.62	1.66	1.45
7.	**Litton Industries**	1.53	1.43	1.73
8.	**GM-Hughes**	1.49	1.44	1.47
9.	Northrop	1.29	1.25	1.51
10.	Boeing	1.28	1.32	1.41
11.	McDonnell Douglas	1.22	1.17	1.06
12.	United Technologies	1.14	1.15	1.36
13.	**Lockheed**	1.04	1.25	1.23
14.	Westinghouse Electric	1.04	1.00	0.77
15.	General Electric	0.91	0.94	1.00

Note: As of March 31, 1993

Source: The Value Line Investment Survey, July 1993.

The average current ratio on March 31, 1993 was 1.54, up slightly from the 1992 year-end figure of 1.49. Martin Marietta, Loral, and Raytheon still possess the liquidity to expand further into the defense electronics sector with their above average cash balances. The liquidity of GM-Hughes Electronics and Litton Industries is slightly below average. Lockheed is the only company pursuing an

expansion strategy with significantly below average liquidity. Although Grumman has one of the strongest balace sheets in the industry, like General Dynamics, it is downsizing and liquidating many of its assets.

Many of the defense companies operate in a number of different industries, which makes it difficult to develop a meaningful set of industry averages for comparative purposes. Removing those companies with less than 40 percent of total revenues in defense increases the current ratio to 1.71. By this measure, only Grumman, Loral, Martin Marietta, and Raytheon truly have the liquidity to expand. This suggests that while highly liquid companies are more likely to expand, lower levels of liquidity will not prevent expansion. As will be discussed in the next section, the ability to incur additional levels of debt can be a substitute for lower levels of liquidity.

b. Capital Structure Ratio

Another measure of financial strength is the company's capital structure. The capital structure ratio measures long-term debt as a percentage of total capitalization (long-term debt plus owner's equity). Extensive dependence on debt makes the company vulnerable to interest rates, lowers its investment rating to prospective creditors, and leaves little room to incur additional debt to finance expansion. Generally, when this ratio is greater than

25 percent, the current capital structure may be detrimental to the company's future become success [Ref. 35:p. 59].

There are wide variations in the use of financial leverage among industries and among individual firms within an industry. The defense industry has seen revenues decline in recent years, which has reduced equity positions. This made it difficult to sell new stock and placed increasing emphasis on debt financing. Forbes "Annual Report on American Industry" reported that in 1992 the median capital structure ratio for the entire aerospace and defense industry was 31.2 percent, the same as the all-industry median, and the average was 37.2 percent [Ref. 36:p. 97]. It is expected that those companies pursuing an expansion strategy will have capital structure ratios below the industry average, indicating the potential to incur additional debt to finance further expansion.

Table VIII indicates the capital structures of the defense companies examined. The 1992 average capital structure for the top 15 defense companies was 23.7 percent, reflecting the financial strength of these companies. Of the expanding defense companies, only Lockheed is significantly higher than the industry average of 37.2 percent. Combined with their high current ratios, Raytheon and GM-Hughes Electronics are well positioned to finance additional expansion.

TABLE VIII: CAPITAL STRUCTURE OF MAJOR DEFENSE COMPANIES

		Capital Structure Ratio		
		1992	1991	1990
1.	**Raytheon**	01%	01%	02%
2.	General Dynamics	02	16	41
3.	**GM-Hughes**	10	02	03
4.	Northrop	11	28	40
5.	General Electric	13	17	16
6.	Boeing	18	14	04
7.	**Martin Marietta**	20	25	23
8.	Rockwell	27	15	12
9.	**Loral**	29	36	54
10.	Grumman	31	42	46
11.	**Litton**	36	38	42
12.	Westinghouse	36	25	19
13.	United Technologies	38	40	42
14.	**Lockheed**	39	36	46
15.	McDonnell Douglas	44	44	50

Source: The Value Line Investment Survey, July 1993.

c. Stock Performance

Wall Street's opinion of a company is a cumulative measure of earnings, debt structure, product lines, management, yield, and other performance measures. A favorable reception by Wall Street encourages investment and provides the needed external financing for expansion and capital investment. Laggard performance in the stock market means increasing the emphasis on debt financing.

Throughout the late 1980's, the stock performance of aerospace/defense stocks lagged the market as a whole, reflecting a bleak future. Today, however, the trend is reversed [Ref. 32:p. 15]. Table IX indicates price performance of defense industry stocks since January 1, 1993 [Ref. 37:p. 16]. The table shows the strong price performance

of defense stocks relative to the Standard and Poor's (S&P) 500 Index and Industrial Index. It is expected that the companies which choose the expansion strategy will have strong price performance, reflecting strong cash flow, confidence in management, and additional capital to finance expansion.

TABLE IX: DEFENSE SECTOR STOCK PERFORMANCE

%Change	Industry Name	# Stocks in Group	Group Index
+ 28.8	Aerospace/Defense	7	183.94
+ 24.5	Aerospace/Defense Equipment	45	132.66
+ 18.4	Electronics-Military Systems	55	115.29
+ 5.3	S&P 500 Index		458.93
+ 1.8	S&P Industrial Index		516.72

Note: 1) % Change is since January 1, 1993
2) The group index measures what $100 invested on January 1, 1984 is worth on October 1, 1993.

Source: Investor's Business Daily, 1 October 1993.

Table X provides detailed data on selected stock data for the defense companies surveyed in this thesis. Based upon the earnings per share (EPS) and relative price strength (RS) rankings listed in the table, the six companies pursuing the expansion strategy are showing earnings growth and relative stock price strength greater than 50 percent of the nation's publicly traded companies. In fact, only Grumman, Litton Industries, Northrop, and Westinghouse Electric are more than 10 percent off their 52- wk highs. The strong price performance in the industry reflects the underlying success in the companies' strategy formulation.

TABLE X: SELECTED STOCK DATA FOR TOP 15 DEFENSE COMPANIES (as of 1 October 1993)

Company	Symbol	52-week High	52-week Low	Current	EPS	RS
Boeing	BA	41	33 1/8	38 3/8	51	47
General Dynamics	GD	94	48 1/4	92 1/8	74	82
General Electric	GE	100 7/8	73 1/8	92 1/8	72	50
GM-Hughes Electronics	GMH	38	17 7/8	37 7/8	72	84
Grumman	GQ	41 7/8	19 5/8	37 1/2	77	72
Litton Industries	LIT	69 3/8	39 1/2	59 3/8	64	62
Lockheed	LK	68 1/2	43 5/8	63 1/2	74	52
Loral	LOR	68 1/2	43 5/8	62 1/2	81	68
Martin Marietta	MM	89	55 1/2	89	68	72
McDonnell Douglas	MD	90 7/8	34 1/4	90 1/8	96	91
Northrop	NOC	42 5/8	22 1/2	35 1/8	67	40
Raytheon	RTN	64 3/4	40 3/4	62 1/8	64	60
Rockwell	ROK	36 3/4	25	36	74	69
United Technologies	UTX	59 3/8	41 1/2	55 1/2	14	60
Westinghouse Electric	WX	17 1/8	9 3/8	13	12	17

Note: General Motors (GM) has three classes of common stock. Class H common stock reflects the financial performance of GM-Hughes Electronics Corporation (GMHE). Holders of stock in GMHE (ticker symbol GMH) have no direct rights in the assets of GMHE, but in the equity and assets of GM, which includes 100 percent of the stock of GMHE. GMHE is a wholly-owned subsidiary of GM.

EPS: Earnings per share measures a company's earnings per share growth in the last five years and the stability of that growth. The percent change in the last two quarters' earnings versus same quarter a year earlier is combined and averaged with the five year record. Result is compared to <u>all</u> companies in the tables and ranked on a scale from 1 to 99, with 99 being the highest. A 90 rank means the company produced earnings in the top ten percent. Companies with superior earnings records rank 80 or higher.

RS: Relative price strength measures daily each stock's relative price strength over the last 12 months compared to <u>all</u> other stocks. Results are ranked from 1 to 99, with 99 being the highest. Those stocks below 70 indicate weaker or more laggard price performance.

Source: <u>Investor's Business Daily</u>, 1 October 1993.

5. Summary of Expansion Factors

Table XI provides a summary of the major factors influencing the strategies of defense companies. The growth potential of a company's core business appears to be a better predictor than exposure to defense spending. Although the recent bull market and the success of alternative strategies has boosted stock prices, liquidity and capital structure have also proven to be influential factors. The companies in the defense electronics sector with financial strength are most likely to pursue a strategy of acquiring or expanding into markets that complement their existing technology.

Raytheon, GM-Hughes Electronics, and Loral are all poised for further developments that expand their market share in defense and capitalize on core competencies in defense electronics. Rockwell is also positioned to pursue an expansion strategy. Companies such as Boeing, McDonnell Douglas, United Technologies, and General Electric are beginning to suffer the effects of a world-wide recession and reduced air travel. Revenues have flattened or declined, threatening their currently strong financial strength. With little growth in their core defense businesses, these companies will pursue alternative strategies.

Lockheed saw an opportunity to take the lead in tactical aircraft consolidation, despite having below average financial strength and low growth prospects for its principal business. The fighter/attack aircraft business consisted of

four manufacturers--Grumman, Lockheed, McDonnell Douglas, and General Dynamics. Grumman and McDonnell Douglas are facing reduced production due to mature programs like the F-16, F-14, F-15, and F-18. The only figher aircraft in the pipeline is the F-22 Advanced Tactical Fighter, to be produced by a team of Lockheed, General Dynamics, and Boeing. Lockheed's purchase of General Dynamics' Fort Worth Division not only reduced the cost of the F-22 program by cutting the overhead bill, but it also gained market share for Lockheed at the expense of fading competitors like Grumman and McDonnell Douglas.

As the process of Darwinian natural selection continues, the fittest companies described in this chapter will flourish and continue to grow. However, as the current defense spending environment continues to shrink, fewer opportunities exist for expansion in the defense sector. The next chapter will examine an alternative expansion strategy--diversification into commercial markets.

TABLE XI: SUMMARY OF EXPANSION STRATEGY FACTORS

Company	Exposure to Defense Spending >40%	Market Segment Growing (Core Business)	Financial Strength
Boeing	NO	NO(commercial air)	A++
GD	YES	NO (nuclear subs)	B+
GE	NO	NO (aircraft eng)	A++
GM-Hughes	YES	YES (electronics)	A
Grumman	YES	NO (tactical air)	B+
Litton	YES	YES (electronics)	B++
Lockheed	YES	NO (tactical air)	C++
Loral	YES	YES (electronics)	B++
Martin Marietta	YES	YES (electronics)	A
McD Douglas	YES	NO(commercial air)	C++
Northrop	YES	NO (strategic air)	B+
Raytheon	YES	YES (electronics)	A
Rockwell	YES	YES (electronics)	A+
United Tech	YES	NO (engines)	A
Westinghouse	NO	YES (electronics)	B++

Note: Financial strength is the rating provided by The Value Line Investment Survey as of July 31, 1993 with A++ the highest rating available. The rating is considered complementary to the factors analyzed in this chapter.

IV. DIVERSIFICATION INTO COMMERCIAL MARKETS

A. FUNDAMENTALS OF THE DIVERSIFICATION STRATEGY

Declining defense revenues and negative growth in core defense businesses have forced many defense companies to convert their production lines and diversify into commercial markets. This chapter of the thesis will outline the basic elements of the diversification strategy, its advantages and the barriers to implementation. Succeeding sections will focus on the defense companies that are pursuing the diversification strategy and the factors that guided management's decision to pursue such a strategy. Although many companies are relying more on commercial revenues, this chapter will analyze only those companies aggressively pursuing such a strategy.

The diversification strategy is much more than simply improving the existing commercial business. It is a variation of the 'Invest & Grow' approach outlined in Figure 11 [Ref. 7:p. 8]. Diversification involves the conversion of existing product lines into civilian-oriented pursuits, opening new lines of civilian-oriented products, or buying commercial businesses. Current defense backlogs will support companies through this transition period as they diversify and expand into commercial markets.

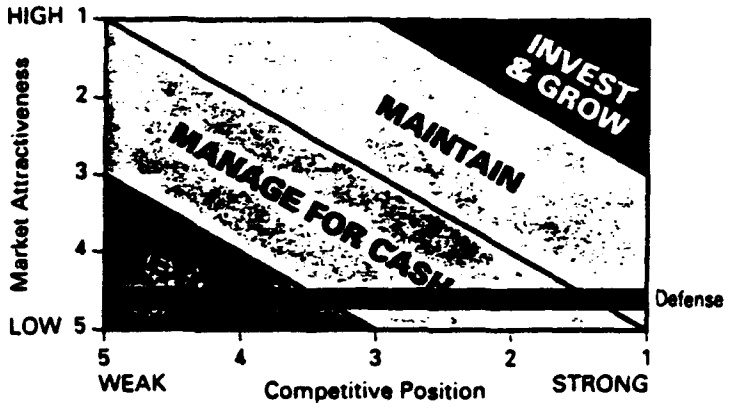


Figure 11: The General Dynamics Strategic Matrix

The United States Government has been particularly active in promoting this strategy. Created in 1992, the Defense Conversion Commission (DCC) favors actions which promote the integration of military and commercial technology, products, and processes--including removing barriers to integration and increasing reliance on the private sector for defense goods and services [Ref. 1:p. iv]. The DCC's publication, Adjusting to the Drawdown, was published in December 1992 and addresses these issues.

The "800 Panel" was established by the fiscal 1991 defense authorization bill. The panel is headed by Senator Jeff Bingaman (D-NM), Chairman of the Senate Armed Services Subcommittee on Defense Industry and Technology, and includes acquisition experts and representatives from the defense industry. The panel's 1800-page report on how the Pentagon can simplify defense contracting and make it easier for companies to diversify was submitted to Congress in January 1993. [Ref. 38:p. 42]

An 18-month study by the Center for Strategic and International Studies reported that "without links between the commercial and defense sector, the pace of innovation in each is slowed--and both the nation's security and economic competitiveness suffer." [Ref. 39:p. xi] Currently, the national pool of scientists and engineers is split, with nearly one-third employed only in military work [Ref. 39:p. xi] Diversification will foster the free-flow of state-of-the art technology between both sectors and will provide the DoD with a larger industrial base upon which it can draw in times of crisis. Government-led efforts such as the DCC and the "800 Panel" are intended to facilitate this transition for defense related companies.

These efforts are necessary because of the increased segregation of the defense sector. This segregation is largely the result of barriers which diminish the ability of defense companies to compete with commercial companies. These barriers result in price increases for defense companies and include the following:

- Government unique accounting practices
- DoD-unique standards and specifications
- Government's ownership of rights in technical data
- Government-unique contract and information collecting requirements
- Government audit and oversight roles [Ref. 1:p. 19]

Table XII outlines many of the major differences between the two sectors [Ref. 10:p. 61]. Defense companies are organized to operate within an environment in which the government, not the market, determines what is produced. The

presence of increased competition for a civilian-oriented firm is clearly seen in the table. Managerial discretion widens and additional risk is borne by the company. Diversification requires increased emphasis on market factors such as cost control, quality, and customer service. Even if the barriers can be overcome, diversification presents obstacles.

TABLE XII: KEY DIFFERENCES BETWEEN CIVILIAN AND DEFENSE FIRMS

Characteristic	Civilian-related Firm	Defense-related Firm
Products	Low technology	High technology
Market Demand Supply	 Competitive Competitive	 Monopsonistic Oligopolistic
Prices	Constrained by market competition	Determined or influenced by government
Outputs	Constrained by market competition	Determined by government
Financing	Security markets	Federal government
Burden of risk	Borne by firm	Divided between firm and government
Managerial Discretion	Relatively wide	Severely constrained
Profits	Constrained by market competition	Regulated via contract

Source: Murray Weidenbaum, Small Wars, Big Defense: Paying for the Military After the Cold War, p. 144.

The McKinsey study, conducted for General Dynamics in 1986, found an economic failure rate of 80 percent for acquisitions by defense companies of non-defense businesses.

This failure rate is slightly lower for diversification efforts by non-defense companies. The study blames the barriers identified in Table XII for the high failure rate. [Ref. 7:pp. 13-14]

Although history and current research point to many of the problems associated with diversification into new markets, many of the top 15 defense contractors are pursuing such a strategy. The next section of the thesis will highlight the most significant events associated with the industry's diversification efforts. The final section will examine the factors that shaped the diversification strategy.

B. DEFENSE COMPANIES IN PURSUIT OF DIVERSIFICATION

Table XIII reflects the growing trend towards diversification. The table provides a summary of new DoD contract awards displayed as a percentage of total sales. Martin Marietta, Raytheon, Rockwell, and Westinghouse Electric have all seen their defense exposure shrink and are aggressively pursuing commercial diversification. Martin Marietta has seen the most drastic results, with defense contract awards falling 27.4 percent between 1990 and 1992. McDonnell Douglas also saw defense contracts fall significantly in 1991 and 1992. This is primarily the result of the A-12 cancellation, structural and contractual problems with the C-17, and decreased production of the F-15 [Ref. 40:pp. 25-26]. McDonnell Douglas is focusing on globalizing and downsizing its operations.

TABLE XIII: NEW DEFENSE CONTRACT AWARDS AS A PERCENTAGE OF TOTAL REVENUES ($million) (1)

	1992		1991		1990		Trend
Boeing	2,748	9.1	1,397	4.8	2,424	8.8	+ 0.3
	30,184		29,314		27,595		
General Dynamics	3,450	99.4	7,917	90.5	6,569	64.6	+34.8
	3,472		8,751		10,173		
General Electric	4,174	11.0	5,144	11.9	5,823	13.5	- 2.5
	37,943		43,089		43,017		
GM-Hughes (2)	4,558	37.5	4,495	39.2	4,306	37.0	+ 0.5
	12,169		11,481		11,626		
Grumman	2,188	62.7	2,345	59.2	2,725	68.3	- 5.6
	3,492		3,964		3,990		
Litton	2,318	40.7	1,545	29.6	1,562	30.3	+10.4
	5,693		5,219		5,156		
Lockheed	4,655	46.1	2,345	23.9	3,855	38.7	+ 7.4
	10,100		9,809		9,958		
Loral	1,662	49.8	1,202	41.7	557	26.2	+23.6
	3,335		2,882		2,127		
Martin Marietta	2,496	41.9	2,781	45.8	4,246	69.3	-27.4
	5,954		6,075		6,126		
McDonnell Douglas	5,590	32.2	8,053	43.7	8,923	54.9	-22.7
	17,384		18,448		16,255		
Northrop	4,850	87.4	3,322	58.3	748	13.6	+73.8
	5,550		5,694		5,490		

(continued on next page)

TABLE XIII: NEW CONTRACT AWARDS FOR DEFENSE COMPANIES (continued)

	1992		1991		1990		Trend
Raytheon	2,843	31.4	4,132	44.6	4,167	45.0	-13.6
	9,058		9,274		9,268		
Rockwell	1,267	11.6	1,742	14.6	2,230	18.0	- 6.4
	10,910		11,927		12,379		
United Technologies	3,087	14.3	2,938	14.1	2,951	13.8	+ 0.5
	21,641		20,840		21,442		
Westinghouse Electric	1,238	14.7	1,887	14.7	2,274	17.6	- 2.9
	8,447		12,794		12,915		

Key:

Fiscal Year	
Contract Awards	Percent
Total Revenue	

Note: (1) Defense contract awards are based on prime contracts of $25,000 or more for the DoD
(2) Defense contract awards include those for General Motors and GM-Hughes Electronics; separate data unavailable

Source: Government Executive, August 1991-93; The Value Line Investment Survey, July 1993.

GM-Hughes Electronics, Lockheed, Loral, and Northrop are all pursuing more modest diversification strategies, secondary to their expansion strategies. All four companies have seen their exposure to defense spending increase despite these diversification attempts. Northrop's surge in defense exposure is primarily the result of its B-2 stealth bomber sales, which now account for nearly 60 percent of total revenues [Ref. 41:p. 29]. 1991 military contracts surged as the company obtained a long-run initial production (LRIP) contract for the B-2, as well as follow-up contracts for the next generation F/A-18 [Ref. 41:p. 34]. Also, Northrop's acquisition of LTV's aerospace and defense business contributed to 1992's higher contract level. With B-2 production scheduled to end in 1997 and revenues expected to decline dramatically, Northrop is beginning to realize the importance of diversification. Table XIV provides a summary of those companies pursuing the diversification strategy.

TABLE XIV: DEFENSE COMPANIES PURSUING THE DIVERSIFICATION STRATEGY

Diversification Strategy	
Primary	Secondary
Martin Marietta Raytheon Rockwell Westinghouse Electric	GM-Hughes Electronics Lockheed Loral Northrop

1. Martin Marietta

In addition to expanding its defense business, Martin Marietta's "Peace Dividend Strategy" calls for "broadening and increasing participation in civil government and commercial markets that are closely related to our current strengths". [Ref. 27:p. 3] In 1992 alone, Martin Marietta's civil government sales increased by more than 20 percent. Sales for that year include new contracts with the Department of Energy, the Environmental Protection Agency, and the Treasury Department. In 1992 Martin Marietta completed deliveries of 267 automated flats-sorting machines, capable of processing 10,000 magazines and large envelopes an hour, to the U.S. Postal Service. Martin Marietta foresees future growth in upgrading existing sorters, developing next generation bar code sorters, and developing image recognition technology in sorting mail. [Ref. 27:pp. 15-16]

Martin Marietta's Materials Group acquired quarries in Virginia and Iowa in order to fortify its position as one of the world's leading producers of crushed rock. Shipments of crushed stone, gravel and sand increased 12 percent to 56 million tons in 1991. The company is betting that an improving economy, accelerating highway construction in the Southeast and Midwest, and additional government infrastructure initiatives will result in further growth in this area. [Ref. 27:p. 22]

The Astronautics Group of Martin Marietta is actively seeking private sector applications of its DoD electronic and electromechanical technology. The company is spending increasing amounts of RDT&E on applications such as the use of advanced photovoltaics. Originally developed to provide solar power for orbiting spacecraft, this technology is now being used in generating clean electrical power on Earth and in image-processing technology to screen and analyze medical images such as mammograms. The company's Zetatron ion accelerator, derived from defense related technology, is becoming an important tool in fields ranging from medicine to environmental monitoring. [Ref. 27:p. 10]

2. Raytheon

Raytheon Chairman and Chief Executive Officer Dennis J. Picard wants his company to receive half of its profits from commercial enterprises, up from nearly 30 percent in 1992 [Ref. 42:p.1]. Raytheon's current commercial products have been highly successful. The appliance group is introducing a wide range of new products, including energy efficient refrigerators from Amana and newly designed washers and dryers from Speed Queen. Raytheon Marine Company is enjoying solid growth with its autopilots, instruments, and electronic chart plotters and is increasing its market penetration in these areas. The company is also a major player in the Federal Aviation Administration's upgrading of the nation's air traffic control systems.

In June of 1993 Raytheon purchased the Corporate Jets business from British Aerospace PLC for $390 million in cash. Corporate Jets makes 125-800 and 125-1000 jets which seat up to 12 passengers. The acquisition will complement Raytheon's Beech Aircraft business which makes turboprops and light jets and is expected to boost annual sales in the aircraft market to greater than $1.7 billion. The acquisition is seen as a major move to rebound in the commercial airline business. [Ref. 43:p. 19]

3. Rockwell

Cancellation of the small ICBM program and mature defense programs like the B-1 bomber and MX missile have forced Rockwell to diversify its business. Rockwell is expanding into the wireless communications market, with an integrated circuit family designed for digital cellular telephones, and commercial avionics. In the first quarter of 1993, Rockwell purchased Sundstrand Corporation's Data Control Division, which will become part of Rockwell's Commercial Avionics business, for $225 million. The company makes flight data and cockpit voice recorders, ground proximity and wind shear warning computers, flight management systems, and other avionics products. [Ref. 44]

4. Westinghouse Electric

President Clinton used a Baltimore Westinghouse plant as the backdrop for his multi-billion-dollar defense conversion program announcement in early 1993. He touted

Westinghouse as a "stunning example of just how brilliantly [conversion] can be done...." [Ref. 33:p. 82] Westinghouse wants its military-laden electronics division to receive 50 percent of its total revenues from non-defense markets by the mid-1990s, up from 27 percent in 1992 [Ref. 45:pp. 5-7]. Westinghouse is pursuing opportunities in law enforcement, security systems, transportation management, information systems, and electric vehicles. The company is also a market leader in postal automation systems and environmental services, including the only incinerator in the United States permitted to burn low-level radioactive waste.

5. GM-Hughes Electronics

GM-Hughes Electronics has recently formed a special business segment which concentrates solely on new and emerging markets in commercial technology. Representing 18 percent of 1992 revenues, the telecommunications and space segment already produces 40 percent of the satellites currently in service for commercial communication [Ref. 22:p. 5]. GM-Hughes Electronics' largest effort is in the new direct-to-home television broadcasting service called DirecTv™. DirecTv™ has already signed The Disney Channel and Paramount Picture's video division for its scheduled introduction in 1994. An alternative to cable television, DirecTv™ will offer satellite service with over 150 channels beamed to a small 18 inch antenna at the customer's home. [Ref. 22:p. 18]

GM-Hughes Electronics is also anticipating continued growth in its automotive electronics segment as emission and fuel economy standards tighten, as well as increased demands for safety features. Independent sources estimate that the average electrical content of automobiles could rise from $760 in 1992 to $1,800 per vehicle by the end of the decade [Ref. 22:p. 6]. In 1992, GM-Hughes became the first manufacturer to successfully introduce a single computer that combines emission, fuel, and rear-wheel anti-lock brake control [Ref. 22:p. 9].

6. Lockheed

Lockheed's heavy-lift launch capability provides tremendous opportunities in the future. According to the 1992 Annual Report, Lockheed has been responsible for 42 of the 52 space shuttle missions from liftoff to landing [Ref. 23:p. 23]. Lockheed is contracted to provide satellites for Motorola's IRIDIUM™ space-based communication system and recently formed a joint venture with Khrunichev Enterprises, a Russian Aerospace firm, to participate further in the commercial satellite business.

Lockheed is also pursuing new contracts in bar coding services for the U.S. Postal Service, automated toll road collection procedures, and child support and parking ticket collection services [Ref. 23:p. 5]. The company's joint venture with AT&T addresses the problems of highway congestion. Their plans call for an intelligent vehicle

highway system which would make use of radio, video, and computers to form an intelligent network, providing such things as automatic toll collection and traffic management. A "smart card" with a microscopic computer attached to the car will replace rolls of quarters and toll booths. The value of this market is estimated at $200 billion over the next 20 years. [Ref. 23:p. 24]

7. Loral

Loral expects that by 1995, over 35 percent of total revenue will come from non-defense sources, up from 20 percent in 1992. Loral is expanding its market share in such products as data recorders, telecommunication switches, network management systems, computer-based training and simulation systems, large-scale archiving, information processing services, and commercial satellites. Additionally, the formation of Loral/Globalstar, a joint venture between Loral and Space Systems/Loral, a partially owned subsidiary acquired from Ford Motor Company, positions the company for further expansion in the commercial satellite market. [Ref. 25:pp. 5,7]

8. Northrop

In an effort to further enhance its position in the aircraft subassembly business, Northrop established a separate commercial aircraft division in 1992. Facing declining DoD revenues and having mature defense programs, Northrop wants to become a subassembly giant, supplying "the biggest parts of

the biggest planes". [Ref. 32:p. 67] In 1992, Northrop and the Carlyle Group purchased a minority interest in LTV's Vought Aircraft business. Vought is an $800 million business that supplies components such as the tail section pieces to Boeing jets. The Vought acquisition complements Northrop's already strong subcomponent products which include fuselage, cargo and passenger doors; floorbeams; and other structural components for versions of the 747. For over 25 years Northrop has been Boeing's largest subcontractor, drawing about ten percent of 1992 total sales from the 747 production program [Ref. 41:p. 15].

Despite the past failures and risks associated with commercial diversification, this section showed that many defense companies are making major impacts on commercial markets. Although not intended to be all inclusive, Table XV provides a summary of the major defense industry diversification highlights. The next section of the chapter will examine the factors that have framed the evolution of the diversification strategy.

TABLE XV: DEFENSE INDUSTRY DIVERSIFICATION HIGHLIGHTS

General Motors-Hughes Electronics
1993: -Signs first two programming contracts for its new DirecTv service -Automotive electronics reorganized into Delco Electronics to better enhance competitive position 1992: -Joint venture with Lockheed and Morrison-Knudsen Corp to develop high-tech mass transit cars -$749.4 million second quarter restructuring write-off (7 groups consolidated into 3, including a new commercial opportunities segment
Lockheed
1992: - Announces plans to co-market an "intelligent vehicle highway system" with AT&T
Loral
1992: -Loral/Globalstar joint venture to explore mobile cellular telephone market
Martin Marietta
1992: -Crushed Stone unit of the Materials Group acquires two stone quarries; opens up two new quarries 1991: -$38.5 million contract with U.S. Postal Service to improve and automate mail processing
Northrop
1992: -Selected by the Los Angeles Rapid Transit District to lead a group in the design and development of a lightweight bus using composites used in military aircraft -Establishes a Commercial Aircraft Division -Purchases a minority interest in LTV's Vought Aircraft Company

(continued on next page)

TABLE XV: DEFENSE INDUSTRY DIVERSIFICATION HIGHLIGHTS (continued)

Raytheon
1993: -Acquires the Corporate Jets business of British Aerospace PLC -Announces joint venture to manufacture and assemble the X2000 high speed tilt train for use by Amtrak 1992: -Loses bid for Cessna Aircraft to Textron
Rockwell
1993: -Purchases Sundstrand Corporation's Data Control Division -Acquires Sprecher and Schuh AG of Switzerland -Teams with Sumitomo Corporation of America to build rail cars for Los Angeles' Metro Green Line passenger rail system
Westinghouse Electric
1992: -Acquired Florida First Processing, Inc.

Source: Wall Street Journal Index; 1992 Annual Reports

C. FACTORS SHAPING STRATEGY SELECTION

The purpose of this section is to analyze the factors that have shaped the diversification strategy within the defense sector. The factors are illustrated in the flowchart in Figure 12. First, a company must consider whether or not it wishes to decrease its exposure to defense spending. Second, current technology and production facilities must not only be compatible with commercial applications, but diversification must be into a growing market. Third, companies must consider their ability to fund this expansion or conversion. The interaction of all three factors is the final determinant in strategy selection.

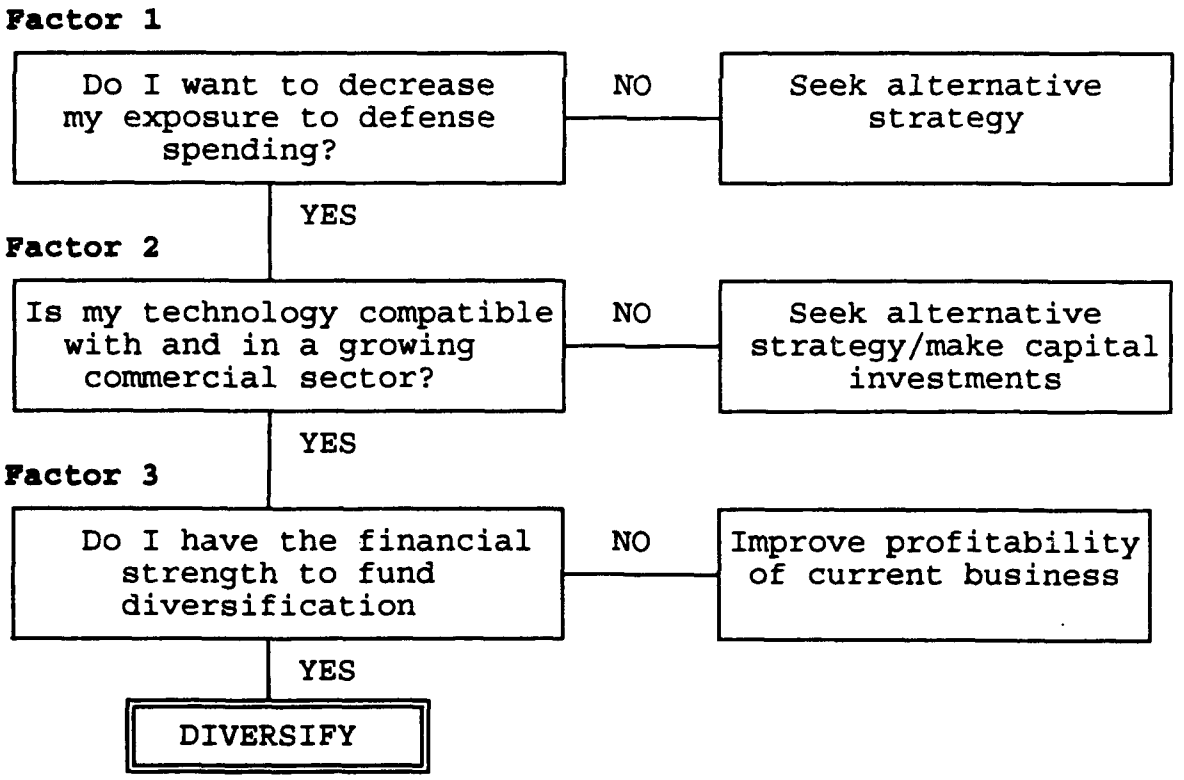


Figure 12: Factors Framing the Diversification Strategy

It is expected that those defense companies which face declining defense revenues will consider pursuing a diversification strategy. However, the current defense spending environment has resulted in few market niches that are not shrinking. Given the context of the current environment, all of the defense companies analyzed in this thesis can benefit from commercial diversification, assuming the factors in this section agree. The issue is the degree of diversification to be pursued. Therefore, the defense sector within which the company participates was not considered a factor in selection of the diversification strategy.

1. Exposure to Defense Spending

A 1991 study by the Center for Strategic and International Studies (CSIS) found that nearly one-half (44 percent) of U.S. defense companies planned on increasing their percentage of civilian over military sales in the next five years. This number falls to 32 percent when excluding those companies in which DoD sales are less than 50 percent of total sales. [Ref. 46:p. 5] The study suggests that the specialized nature of doing business with the Pentagon, as outlined in Table XII, inhibits diversification. It is also possible that companies which are highly exposed to defense spending, unless in a "niche" sector, are more likely to hedge against further defense spending reductions through diversification. It is therefore difficult to predict whether or not a more exposed company is more likely to diversify.

Table XVI lists the top DoD contractors based on 1991 defense and space revenues as a percentage of total revenues [Ref. 10:p. 60]. It should be noted that all four of the extremely exposed companies pursuing diversification are pursuing expansion as their primary strategy. Westinghouse Electric is the only diversifying company not extremely or highly exposed. This table suggests that while companies with higher exposure to defense spending may be slightly more inclined to diversify, there are additional factors to consider. Therefore, exposure to defense spending does not appear to be a strong predictor of diversification.

TABLE XVI: EXPOSURE TO DEFENSE SPENDING

Company	Percent	Category
Grumman	90.8	Extremely Exposed
Northrop	89.6	
Martin Marietta	85.6	
Lockheed	85.0	
General Dynamics	84.6	
Loral	75.3	
McDonnell Douglas	55.1	Highly Exposed
Raytheon	53.9	
GM-Hughes Electronics	49.6	
Litton Industries	46.9	
Rockwell	43.6	
United Technologies	25.9	Moderately Exposed
Westinghouse Electric	25.4	
Boeing	19.9	
General Electric	12.3	Minimally Exposed

Note: Percent = 1991 defense and space revenues as a percentage of total revenues

Source: DRI/McGraw-Hill

2. Core Commercial Technologies

Perhaps a more critical factor in predicting corporate diversification is the commercial market within which the company currently participates. Areas of the commercial market to be captured must exploit the strengths of the defense companies--namely large-scale high-tech systems integration. Companies which have technology that is compatible with a growing commercial market are more likely to aggressively diversify.

A DRI study identified six potential areas of diversification for defense companies: commercial aircraft manufacturing, air traffic control systems, non-defense space systems, environmental systems, intelligent vehicle-highway systems, and high-speed ground transportation [Ref. 32:p. 129]. Other analysts have included digital cellular communication systems, digital signal compression, character recognition, direct broadcast satellites, airport integration systems, high-speed rail transit systems, and magnetic levitation trains. As noted in section B of this chapter, many of the diversifying companies are already pursuing activities in these markets.

Table XVII provides a list of the major non-defense products and services offered by these companies. The products and services noted in bold are the high-growth commercial markets described in the preceding paragraph. As illustrated in the table, those companies with a substantial

presence in these growth segments have shown a higher tendency to diversify. Boeing is the only company with a strong presence in these markets that is not diversifying, principally because of its already strong position in these markets. General Dynamics, General Electric, McDonnell Douglas, and United Technologies have minimal footprints in these growing sectors and are pursuing alternative strategies. All four of the companies identified in Table XIV as pursuing diversification as their primary strategy have a strong presence in these markets.

TABLE XVII: PRINCIPAL NON-DEFENSE PRODUCTS AND SERVICES

Boeing	**aircraft, advanced computing & telecommunications**
General Dynamics	**space systems** (pending sale to Martin Marietta)
General Electric	aircraft engines, appliances, broadcasting, electrical products, **energy systems**, finance
GM-Hughes Electronics	**satellite-based communications, air traffic control systems**, auto components
Grumman	commercial aircraft components, electronic data processing, special purpose vehicles
Litton	integrated manufacturing and **industrial automation systems**, resource exploration
Lockheed	**space systems, traffic systems**, computer equipment
Loral	**advanced electronics, space communication systems**
Martin Marietta	**space systems, information systems, air traffic control, energy systems**, construction
McDonnell Douglas	**aircraft**, launching vehicles, finance, equipment leasing
Northrop	**transit systems**, commercial aircraft components and **avionics**
Raytheon	**telecommunications equipment, air traffic control, energy and environmental services**
Rockwell	**industrial automation systems, space systems,** automotive components, graphics
United Technologies	aircraft engines, air conditioning and heating, automotive components
Westinghouse Electric	**power plants, satellite-based communications, environmental services**, broadcasting

Source: 1992 Annual Reports

3. Financial Strength

The final factor that determines if the expansion strategy is to be pursued is the financial strength of the company. This section of the thesis will examine three measures of financial strength: current ratio, capital structure ratio, and stock performance. These measures are described in detail in section C of Chapter III.

a. Current Ratio

The current ratio is a measure of liquidity provided by cash generated from operating activities. Diversification requires companies to have cash to finance acquisitions of commercial businesses, convert production lines and increase capital spending by investing in new production lines and equipment. Diversifying companies would be expected to have greater liquidity, as measured by the current ratio multiple, than the industry average. Table XVIII lists the liquidity of the top 15 defense contractors for the last three years.

The average current ratio on March 31, 1993 was 1.54, up slightly from the 1992 year-end figure of 1.49. Martin Marietta, Loral, Raytheon, and Rockwell all possess the liquidity for further investments in commercial production. The remaining four diversifying companies have below-average cash levels. This data suggests that lower levels of liquidity will not prevent diversification. As will be discussed in the next section, the ability to incur additional

levels of debt can be a substitute for lower levels of liquidity.

TABLE XVIII: LIQUIDITY OF MAJOR DEFENSE COMPANIES

		Current Ratio		
		1993	1992	1991
1.	**Martin Marietta**	2.95	1.71	1.41
2.	Grumman	2.42	2.43	3.88
3.	**Loral**	1.81	1.98	1.64
4.	**Raytheon**	1.78	1.77	1.38
5.	General Dynamics	1.65	1.88	1.39
6.	**Rockwell**	1.62	1.66	1.45
7.	Litton Industries	1.53	1.43	1.73
8.	**GM-Hughes Electronics**	1.49	1.44	1.47
9.	**Northrop**	1.29	1.25	1.51
10.	Boeing	1.28	1.32	1.41
11.	McDonnell Douglas	1.22	1.17	1.06
12.	United Technologies	1.14	1.15	1.36
13.	**Lockheed**	1.04	1.25	1.23
14.	**Westinghouse Electric**	1.04	1.00	0.77
15.	General Electric	0.91	0.94	1.00

Note: As of March 31, 1993

Source: The Value Line Investment Survey, July 1993.

b. Capital Structure Ratio

The capital structure ratio measures long-term debt as a percentage of total capitalization (long-term debt plus owners' equity). It is expected that those companies pursuing a diversification strategy will have capital structure ratios below the industry average, indicating the potential to incur additional debt to finance further commercial expansion. Forbes reported that in 1992 the average capital structure for the entire aerospace and defense industry was 37.2 percent [Ref. 36:p. 97].

Table XIX displays the capital structures of the defense companies examined in this thesis. Of the diversifying defense companies, only Lockheed is above the industry average of 37.2 percent. The table indicates that United Technologies and McDonnell Douglas also have higher than average capital structure ratios, suggesting that the remaining 12 companies are outperforming the industry and do have the capacity to expand commercially.

TABLE XIX: CAPITAL STRUCTURE OF MAJOR DEFENSE COMPANIES

		Capital Structure Ratio		
		1992	1991	1990
1.	**Raytheon**	01%	01%	02%
2.	General Dynamics	02	16	41
3.	**GM-Hughes Electronics**	10	02	03
4.	**Northrop**	11	28	40
5.	General Electric	13	17	16
6.	Boeing	18	14	04
7.	**Martin Marietta**	20	25	23
8.	**Rockwell**	27	15	12
9.	**Loral**	29	36	54
10.	Grumman	31	42	46
11.	Litton Industries	36	38	42
12.	**Westinghouse Electric**	36	25	19
13.	United Technologies	38	40	42
14.	**Lockheed**	39	36	46
15.	McDonnell Douglas	44	44	50

Source: The Value Line Investment Survey, July 1993.

c. Stock Performance

A favorable reception by Wall Street encourages investment and provides the needed external financing for expansion and capital investment into commercial markets. Table XX provides selected stock data for the defense companies surveyed in this thesis. Based upon the

earnings per share (EPS) and relative price strength (RS) rankings listed in the table, six of the eight diversifying companies have outperformed 50 percent of the nation's publicly traded companies.

Of the diversifying companies, only Northrop and Westinghouse Electric have shown laggard performance. Declining sales and an overdependence on the volatile B-2 program have restrained Northrop's stock performance. Westinghouse's stock performance has been battered by poor performance by its Financial Services and Broadcasting businesses. Both units are being liquidated which should improve Westinghouse's financial outlook in the future.

4. Summary of Diversification Factors

Highly exposed companies like Lockheed, Loral, Martin Marietta, and Northrop have realized the importance of diversification. In addition to expanding in the defense sector, these companies continue to seek commercial markets as a hedge against additional cuts in defense spending. Westinghouse Electronics is also pursuing diversification despite being more modestly exposed to defense spending. The current exposure to defense spending was therefore not a strong predictor of diversification.

Many defense companies view the current defense spending drawdown as permanent and believe diversification is a necessary survival strategy. These companies believe that their future profitability is dependent upon their ability to

TABLE XX: SELECTED STOCK DATA FOR TOP 15 DEFENSE COMPANIES (as of 1 October 1993)

Company	Symbol	52-week High	52-week Low	Current	EPS	RS
Boeing	BA	41	33 1/8	38 3/8	51	47
General Dynamics	GD	94	48 1/4	92 1/8	74	82
General Electric	GE	100 7/8	73 1/8	92 1/8	72	50
GM-Hughes Electronics	GMH	38	17 7/8	37 7/8	72	84
Grumman	GQ	41 7/8	19 5/8	37 1/2	77	72
Litton Industries	LIT	69 3/8	39 1/2	59 3/8	64	62
Lockheed	LK	68 1/2	43 5/8	63 1/2	74	52
Loral	LOR	68 1/2	43 5/8	62 1/2	81	68
Martin Marietta	MM	89	55 1/2	89	68	72
McDonnell Douglas	MD	90 7/8	34 1/4	90 1/8	96	91
Northrop	NOC	42 5/8	22 1/2	35 1/8	67	40
Raytheon	RTN	64 3/4	40 3/4	62 1/8	64	60
Rockwell	ROK	36 3/4	25	36	74	69
United Technologies	UTX	59 3/8	41 1/2	55 1/2	14	60
Westinghouse Electric	WX	17 1/8	9 3/8	13	12	17

Note: General Motors (GM) has three classes of common stock. Class H common stock reflects the financial performance of GM-Hughes Electronics Corporation (GMHE). Holders of stock in GMHE (ticker symbol GMH) have no direct rights in the assets of GMHE, but in the equity and assets of GM, which includes 100 percent of the stock of GMHE. GMHE is a wholly-owned subsidiary of GM.

EPS: Earnings per share measures a company's earnings per share growth in the last five years and the stability of that growth. The percent change in the last two quarters' earnings versus same quarter a year earlier is combined and averaged with the five year record. Result is compared to all companies in the tables and ranked on a scale from 1 to 99, with 99 being the highest. A 90 rank means the company produced earnings in the top ten percent. Companies with superior earnings records rank 80 or higher.

RS: Relative price strength measures daily each stock's relative price strength over the last 12 months compared to all other stocks. Results are ranked from 1 to 99, with 99 being the highest. Those stocks below 70 indicate weaker or more laggard price performance.

Source: Investor's Business Daily, 1 October 1993.

keep production lines open using commercial production and have sought diversification independent of their current financial strength. These companies are diversifying in hopes of creating a stronger financial position for themselves in the future. Financial strength was therefore not a very good predictor of diversification.

A better predictor of diversification was the ability of the company to compete in a growing "niche" commercial market. This required compatible technology and core competencies that enabled the company to expand into these new markets. Those companies in rapidly expanding fields such as advanced telecommunications and environmental services were more likely to diversify. It was this factor which explained the diversification of companies such as Lockheed, Northrop, and Westinghouse Electric, all of whom have weak balance sheets and laggard stock performance.

The negative view of failed diversification attempts in the 1970s continues to linger and several companies are pursuing more modest attempts at diversification or avoiding it altogether. As the current defense spending environment continues, it is likely that more defense companies will choose to diversify. Current defense backlogs will continue to support diversification. The following chapter offers an alternative to diversifying--globalization.

V. GLOBALIZATION--REPLACING DoD REVENUES WITH EXPORTS

A. FUNDAMENTALS OF THE GLOBALIZATION STRATEGY

As the current defense spending environment continues to tighten, many companies will look increasingly towards foreign sales. This chapter will address the globalization strategy, its strengths, and barriers to implementation. Succeeding sections will focus on the companies that are pursuing the strategy and the factors that have guided management's decision to pursue such a strategy. The thesis does not address the myriad of issues outside of the company's control, such as foreign investment in U.S. companies and offshore sourcing.

As represented by Figure 13, the globalization strategy is an attempt to maintain current market position in the defense sector by replacing declining DoD sales with sales to foreign governments [Ref. 7:p. 8]. The matrix suggests that only the strongest defense companies should be maintaining their defense investments. However, this chapter will illustrate that several defense companies have viewed globalization as a fundamental strategy to survive in today's market. Globalization is seen as an alternative to diversification. Companies with a desire to remain in the defense sector continue to emphasize the importance of foreign sales.

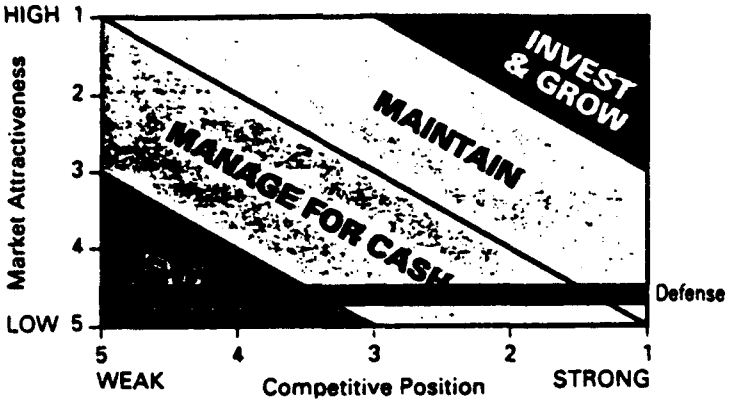


Figure 13: The General Dynamics Strategic Matrix

Accounting for 86 percent of all weapons sold internationally in recent years, the U.S., Great Britain, France, Russia, and China constitute the largest arms exporters. Although the absolute dollar amount of American arms exports fell from $14 billion to $13.6 billion from 1991 to 1992, the U.S. continues to control over 50 percent of the world market. Experts predict that by the end of the decade foreign sales will rise from 15 percent to roughly 25 percent of American arms production. [Ref. 47:p. 100]

Industry executives have long promoted this strategy despite concern from Congress. They have argued that hindering globalization puts U.S. weapons makers at a competitive disadvantage and costs the U.S. jobs. As an unidentified senior industry executive emphasized:

> If Congress or some other group opposes a sale, we just remind them how much more expensive the weapons become and how many thousands of workers in France or Britain will have jobs at the expense of voters like you and me. [Ref. 48:p. 117]

The benefits of globalization are diverse. Globalization improves corporate cash flow by replacing lost or declining DoD sales with exports. Excess capacity is reduced and efficiency is improved, resulting in lower prices to the U.S. Government. Globalization also keeps production lines open that may have otherwise been closed and keeps skilled workers employed. This is especially true in certain sectors, such as tanks and maritime patrol aircraft, in which no DoD purchases are planned for years.

The impact of globalization on our national security continues to be a concern. Critics of globalization cite France, which exports more than half of its weapons, as an example. In 1991, Saddam Hussein turned his French-made weapons against French and other NATO troops during Operation Desert Storm [Ref. 47:p. 100]. The Defense Conversion Commission believes decisions regarding defense exports should be based on a foreign policy and national security analysis, which must also include the impact of the decision on the defense industrial base [Ref. 1:p. 35].

A world-wide economic down-cycle and the end of the Cold War has exacerbated the recession in the arms market. Many foreign defense companies are feeling the same pressures as U.S. defense companies and are also pursuing globalization strategies. Many U.S. firms are finding they cannot compete against many of the modern, low-cost, and often subsidized,

foreign companies. These pressures make it increasingly difficult to export defense products.

Despite these pressures, U.S. sales to the Middle East have jumped from $347 million in 1987 to $3 billion in 1991. Some experts say that Middle East nations spent more than 11 percent of their collective Gross National Product on arms between 1972 and 1988, compared with 2.3 percent in Latin America, and 6.3 percent in Asia. [Ref. 48:p. 116] Table XXI lists the largest foreign buyers of U.S. weapons between 2 August 1990, the beginning of Operation Desert Shield, and 22 February 1993 [Ref. 47:p. 100].

TABLE XXI: LARGEST FOREIGN BUYERS OF U.S. WEAPONS 1990-93

Rank	Country	Defense Sales ($billion)
1	Saudi Arabia	$25.9
2	Kuwait	7.4
3	Taiwan	6.4
4	South Korea	3.8
5	Turkey	3.1

The government continues to analyze its position concerning foreign military sales. Joel Johnson, Vice President of International Programs for the Aerospace Industries Association in Washington D.C. stated:

> There are signs that the [Pentagon] is beginning to recognize that exports can be important to hold down unit costs and even to keep production lines open. As a consequence, there is a new interest in actually supporting U.S. industry in its sales efforts. [Ref. 49:p. 117]

The next section examines these companies and highlights some of the significant events in the global market.

B. DEFENSE COMPANIES IN PURSUIT OF GLOBALIZATION

Table XXII provides a listing of the top ten defense companies in the world based upon 1992 foreign contract awards [Ref. 49:p. 38]. All ten companies are American and are among the top 15 companies analyzed in this thesis. Despite being leading exporters of defense products, only the six bold listed companies are aggressively seeking to expand their global market share.

TABLE XXII: FOREIGN MILITARY SALES ($million)

Rank	Company	Division/Subsidiary Receiving Most Contract Dollars	FY1992 Awards	U.S. Market Share
1	General Dynamics	Fort Worth Division	$1,638	23.22%
2	**McDonnell Douglas**	McDonnell Douglas	482	6.83
3	Lockheed	Missiles & Space	353	5.00
4	General Electric	Aircraft Engine Group	351	4.97
5	**Raytheon**	Missile Systems	333	4.72
6	**GM-Hughes**	Defense Electronics	306	4.33
7	**Martin Marietta**	Electronics & Missiles	252	3.57
8	**Boeing**	Boeing Aerospace	222	3.15
9	**United Technologies**	Pratt & Whitney	198	2.81
10	Grumman	Grumman Aerospace	143	2.03

Note: Rankings are based on prime contracts of $25,000 or more for military R&D, services, and products sold to non-U.S. governments

Source: Government Executive.

In addition to the six listed in bold above, Rockwell and Loral are also expanding globally. Table XXIII outlines those companies which have chosen to pursue the globalization strategy. The classification is somewhat subjective due to the lack of consistency between corporate reports. However,

based on data supplied by 1992 annual reports and Government Executive's annual survey of defense companies, all eight of the globalizing companies have shown an upward trend in foreign military sales. The eight globalizing companies have averaged in excess of five percent growth per year in foreign military sales as a percentage of total defense spending since 1990. The remaining companies showed negative growth of one percent annually in global sales. General Dynamics was the only other top defense company showing an upward trend. However, the 1992 sale of its Fort Worth fighter plane business will reduce its U.S. market share from 23.22 percent to roughly 3.00 percent [Ref. 50:p. 19].

TABLE XXIII: DEFENSE COMPANIES PURSUING A GLOBALIZATION STRATEGY

GLOBALIZATION STRATEGY	
Primary	Secondary
Boeing GM-Hughes Electronics Rockwell United Technologies	Loral Martin Marietta McDonnell Douglas Raytheon

Loral and Martin Marietta are pursuing the globalization strategy secondary to their primary strategy of expansion. McDonnell Douglas and Raytheon are pursuing the globalization strategy secondary to their primary strategies of rationalization and diversification, respectively. The following paragraphs identify some of the recent highlights of the globalization strategy pursued by these companies.

1. Boeing

Boeing claims the title as "the world's number one aerospace company and America's leading exporter." [Ref. 50:p. 3] Receiving over 50 percent of its sales from foreign nations, Boeing's commercial business is hoping its expansion into the Pacific Rim will boost this figure. Boeing's military exports are focused on its E-3 Airborne Warning and Control System (AWACS) aircraft. Built on a Boeing 707 airframe, the AWACS system is used by Saudi Arabia, Great Britain, and France. The system's interoperability with NATO aircraft systems and the new AWACS 767 airframe offer the potential for additional growth. Boeing's F-22 program and the Avenger air defense missile system have recently received export licenses to the Netherlands and Turkey. [Ref. 51:p. 12]

2. GM-Hughes Electronics

From 1986 to 1992, sales of defense-related products and services to international customers increased 14 percent from $589 million to $670 million, with exports to the Middle East representing over 40 percent of 1992 international sales [Ref. 22:p. 22]. The company's airborne radar systems constitute 18 percent of defense electronics revenue and are in many of the world's most powerful aircraft, including the F-14, F-15, F/A-18, AV-8B, U-2R, and B-2. As international sales of these tactical aircraft continue to grow, GM-Hughes

Electronics is strategically positioned to upgrade these systems.

In 1992 Kuwait became the 24th nation to buy the company's air defense system in 30 years. Saudi Arabia, Egypt and China have also ordered air defense systems. GM-Hughes Electronics also provides computer hardware for the F-16, a popular foreign aircraft, and laser rangefinders and sight stabilization systems for the M1A2 tank, recently selected by Kuwait. In an effort to better position itself for international sales, GM-Hughes Electronics established three new business units in 1992--Hughes Europe, Hughes Asia/Pacific, and Hughes Middle East. [Ref. 22:p. 22]

3. Rockwell

Rockwell has seen international revenues from its defense electronics division rise from five percent in 1987 to 25 percent in 1993. Rockwell's expansion into the Pacific Rim has been the driving force behind the explosive international growth. To date, over 50,000 Hellfire missiles have been produced for Far East nations. Rockwell has also signed a memorandum of understanding with Goldstar Corporation of South Korea covering the potential production of the GBU-15 and AGM-130 standoff weapons. Rockwell Systems Australia is the contractor for the combat systems integrator for the Royal Australian Navy's new Collins class submarine and the Royal Australian Air Force's P-3C upgrade and has won over $1.2

billion in contracts from Australia since 1986. [Ref. 52:pp. 29-30]

4. United Technologies

United Technologies' Pratt & Whitney division has 17 commercial engine partnerships with companies in eight countries in Europe and Asia. Pratt & Whitney's F100-PW-229 engine will power the South Korean Fighter Program and the Saudi Arabian F-15, while its F100-PW-220 engine will power Taiwan's F-16 fighter jets. International orders are an important element in the company's plan to maintain production readiness as it prepares to compete for the F-22 advanced tactical fighter engine contract later this decade. [Ref. 18:p. 15]

United Technologies' Sikorsky subsidiary received ten percent of its revenues from international sales in the mid-1980s and foresees 40 percent later this decade. Sikorsky has received helicopter orders from Hong Kong, Saudi Arabia, Morocco, Greece and Mexico, and is pursuing follow-up orders in Columbia, Japan, Korea, Taiwan, and Australia. Sikorsky is currently negotiating contracts with Kuwait, Brazil, and the Netherlands. [Ref. 18:p. 17]

5. Loral

Loral's foreign sales have soared from $188 million in 1990 to $595 million in 1992 [Ref. 25:p. 39]. Loral has at least one significant electronic combat system in each of the world's leading aircraft--F/A-18, F-15, and F-16--

presenting significant international growth opportunities as the sale of tactical aircraft continues. Loral's ALQ-178 electronic counter measure systems protect Israeli and Turkish F-16s. Spain and several Middle Eastern nations have expressed an interest in Loral's Long-Range Oblique Photography System (LOROPS), an aerial reconnaissance system being installed in F/A-18s. Six countries are already deploying Loral's Chaparral air-defense system. [Ref. 25:p. 17-18]

6. Martin Marietta

Martin Marietta's acquisition of GE-Aerospace brings with it substantial international business in fields such as air-defense radars and the new AN/MPS-39 Multiple Object Tracking Radar System. As the principal subcontractor to Raytheon for Patriot Missile bodies, electronic subassemblies, and launchers, Martin Marietta has benefitted by an explosive surge in overseas buying as well as from a 1992 contract to develop an advanced propulsion system to improve the Patriot's range and speed. Additionally, more than 100 long-range air-defense and air traffic control radars are in use or on order by more than 12 countries on four continents. [Ref. 27:pp. 6-7]

7. McDonnell Douglas

McDonnell Douglas is relying heavily on foreign requests to upgrade existing products, such as the F-15, F/A-18, and AV-8B. Recent orders by Spain and Italy for the AV-8B

Harrier II Plus, a new radar-equipped version of the Harrier, by Finland for the F/A-18, and by Saudi Arabia for the F-15E will keep production lines open into the late 1990s. The Saudi F-15E sale is expected to save 40,000 jobs and be worth $13 billion. The United Arab Emirates, Greece, and several other countries have ordered AH-64 Apache helicopters which will sustain production lines into 1996. Foreign sales are critical since Army procurement of the Apache has ended and production ends in mid-1994 for the U.S. Air Force F-15. [Ref. 48:p. 118]

8. Raytheon

Although Raytheon's foreign sales have only increased modestly in recent years, the company remains a strong player in the international market. To enhance their ability to compete for new Middle East business, Raytheon opened a marketing office in Dubai in 1992. Total Patriot missile revenues from sales to Saudi Arabia alone have exceeded $1.5 billion [Ref. 53:p. 2]. Contracts for technical assistance, training, and logistics support for the Patriot and Hawk surface-to-air missile system offer continued growth in the future.

The events described above span many nations and present a picture of an increasingly global market for defense products. The international environment is changing rapidly. As defense companies expand globally, new forms of cooperation are developing, including subcontracting and strategic

partnerships. Expansion overseas is new territory for many companies, but territory they appear willing to explore. Although not intended to be all inclusive, Table XXIV provides a summary of the major highlights of the globalization strategy. The next section of the chapter will examine the factors that have shaped the evolution of the globalization strategy.

TABLE XXIV: DEFENSE INDUSTRY GLOBALIZATION HIGHLIGHTS

GM-Hughes Electronics
1992: -Established Hughes Europe, Hughes Asia/Pacific, and Hughes Middle East -Kuwait becomes the 24th nation to buy an air defense system from GM-Hughes in 30 years 1991: -Selected to develop and implement an air defense system for Saudi Arabia called "Peace Shield"
Loral
1993: -Company's first sale of ALR-56M advanced radar warning receiver to the Korean Fighter Program
Martin Marietta
1992: -Joint venture with French and German firms in producing Counter Battery Radar (COBRA) -First sale of AN/MPS-39 Multiple Object Tracking Radar System to British Ministry of Defense
McDonnell Douglas
1993: -Spain orders AV-8B Harrier II Plus 1992: -Italy orders AV-8B Harrier II Plus -Finland and Saudi Arabia order F/A-18 and F-15, respectively
Raytheon
1993: -Patriot Missile sales to Kuwait and Saudi Arabia 1992: -Opens a marketing office in Dubai -$1.03 billion Patriot Missile sale to Saudi Arabia
United Technologies
1993: -Pratt & Whitney selected to provide engines for Saudi Arabian F-15s 1992: -Pratt & Whitney selected to provide engines for Taiwan's F-16 A/B fighters -Sikorsky selected to produce 95 Black Hawks for Turkey 1991: -Pratt & Whitney selected to provide engines for South Korean Air Force

Source: Wall Street Journal Index; 1992 Annual Reports

C. FACTORS SHAPING STRATEGY SELECTION

The purpose of this section of the thesis is to analyze the factors that have shaped the globalization strategy. These factors are illustrated in the flowchart in Figure 14. First, a company must consider whether or not it wishes to maintain its current defense spending exposure. Second, companies must consider their ability to compete globally. Finally, demand for the company's product overseas must be monitored. Although certain factors will indicate a company should globalize, the interaction of all factors is the final determinant in strategy selection.

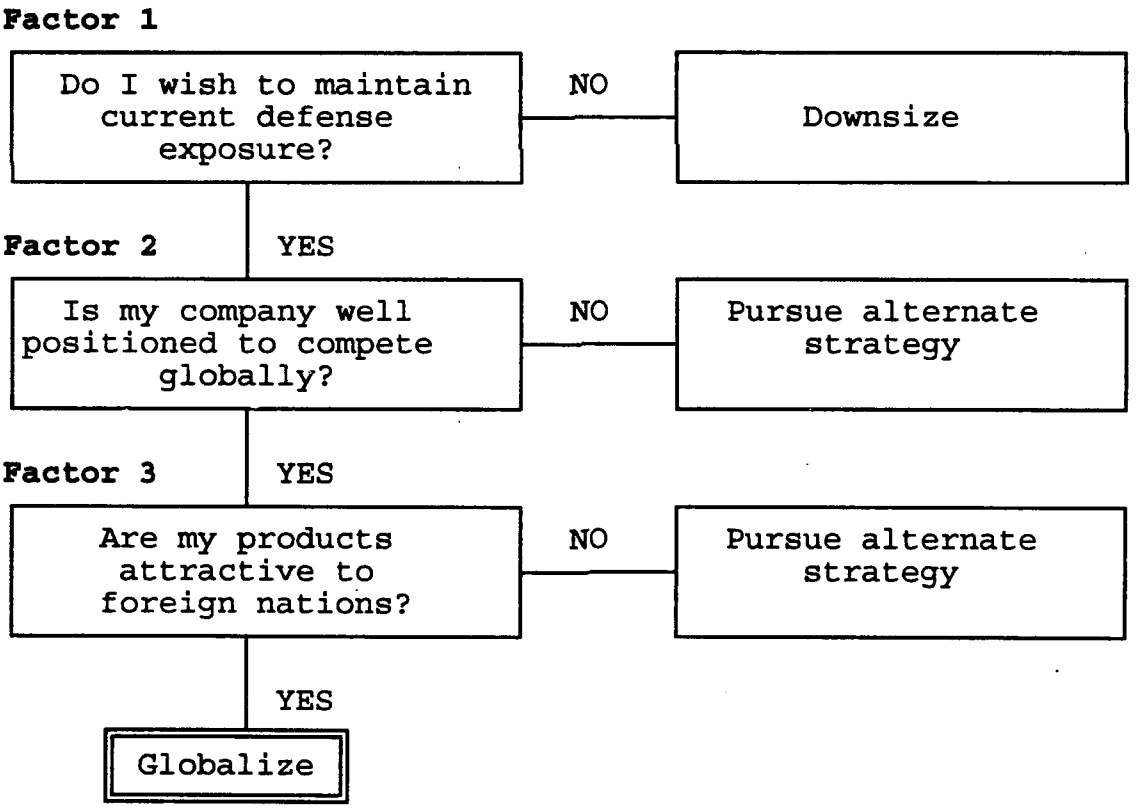


Figure 14: Factors Framing the Globalization Strategy

1. Exposure to Defense Spending

Earlier chapters indicated that those companies with higher exposures to defense spending were more likely to expand and to diversify. It is expected that those companies with higher exposures are also more likely to globalize, which is a form of both expansion and diversification. It involves diversifying into foreign markets and expanding current production. The impact of defense spending reductions is more extreme to highly exposed companies. Foreign sales may be an effective method of replacing declining DoD revenues. Lesser exposed companies are more likely to downsize their operations or exit the defense market completely.

Table XXV lists the top DoD contractors based on 1991 defense and space revenues as a percentage of total revenues [Ref. 10:p. 60]. Globalizing companies range in exposure from Martin Marietta to Boeing. Grumman and General Dynamics have chosen to downsize and Northrop's international sales have been negligible in the past. Although Lockheed remains a global leader in defense exports, the company's focus of the future is on reinforcing its core aircraft business and diversifying into commercial markets. As was found with previous strategies, exposure to defense spending does not prove to be a good predictor of globalization. Additional factors must be considered.

TABLE XXV: EXPOSURE TO DEFENSE SPENDING

Company	Percent	Category
Grumman	90.8	Extremely Exposed
Northrop	89.6	
Martin Marietta	85.6	
Lockheed	85.0	
General Dynamics	84.6	
Loral	75.3	
McDonnell Douglas	55.1	Highly Exposed
Raytheon	53.9	
GM-Hughes Electronics	49.6	
Litton Industries	46.9	
Rockwell	43.6	
United Technologies	25.9	Moderately Exposed
Westinghouse Electric	25.4	
Boeing	19.9	
General Electric	12.3	Minimally Exposed

Note: Percent = 1991 defense and space revenues as a percentage of total revenues

Source: DRI/McGraw-Hill

2. Ability to Compete Globally

To be competitive in a global market, companies must have the infrastructure to handle the additional risks and requirements. International operations and foreign sales carry significant risks such as fluctuations in currency values, domestic and foreign policy regulations, embargoes, hostilities, and exchange restrictions. Many companies hedge against such risks using insurance, contract provisions, government guarantees, and progress payments. Additionally, many defense products need licenses to comply with the Export Administration Act, Trading with the Enemy Act of 1917, and Arms Exports Control Act of 1976 (formerly the Foreign

Military Sales Act). Frequently companies may utilize sales representatives and distributors in connection with foreign sales. [Ref. 54:pp. 8-9]

Given the additional risks and requirements of foreign sales, it is expected that those companies with higher exposure to foreign sales, both commercial and defense, will be more likely to pursue a globalization strategy. Those companies with a higher exposure already have the infrastructure in place to further expand overseas. It is likely that those companies with less exposure lack the expertise and management experience for exports to have a dramatic effect on revenues.

Table XXVI lists the top DoD contractors based on 1992 foreign sales as a percentage of total sales. The table suggests that those companies which are minimally exposed to foreign sales are not likely to pursue a globalization strategy. This explains why Lockheed, Grumman and Northrop all have opted not to expand globally, despite their high exposure to defense spending. While exposure to foreign sales seems to be an adequate predictor of who <u>will not</u> globalize, it is a weak indicator of who <u>will</u> globalize. Foreign demand for a company's product will be the final determinant.

3. Foreign Demand for Products

The threat of global superpower war has been replaced by regional disputes over sovereignty, borders, and religion. <u>Jane's Defense Weekly's</u> annual survey reported 73 "flashpoints

or hot spots" around the world in January 1993, up from 12 in 1992. These hot spots included 26 wars or insurrections, 23 areas of potential conflict, and 24 areas of tension. [Ref. 55:pp. 2-3] These changes in the international political arena will generate increased spending on tactical weapons and systems, both at home and abroad, vice spending on strategic weapons.

TABLE XXVI: 1992 EXPOSURE TO FOREIGN SALES

Company	Percent	Category
Boeing	57.9	Extremely Exposed
General Dynamics	47.2	Highly Exposed
United Technologies	38.0	
McDonnell Douglas	28.7	Moderately Exposed
Litton Industries	27.6	
Rockwell	27.5	
General Electric	21.6	
Loral	20.6	
Raytheon	18.7	
GM-Hughes Electronics	18.0	
Martin Marietta	17.2	
Westinghouse Electric	16.1	
Lockheed	8.4	Minimally Exposed
Grumman	6.1	
Northrop	N/A	

Notes: (1) Percent = 1992 foreign sales as a percentage of total sales
(2) Lockheed data excludes Fort Worth division; data is included in General Dynamics' figure.
(3) General Dynamics data are approximated based on 1992 foreign contract awards
(4) Northrop's foreign sales are negligible and not reported by the company

Source: 1992 Annual Reports

Those defense companies with a strong presence in tactical aircraft and electronic systems are most likely to

benefit from this new climate. Far East and Middle East nations continue to drive demand for these products. Boeing, McDonnell Douglas, and United Technologies will benefit by strong demand for aircraft and aircraft engines. Lockheed's purchase of General Dynamics' Fort Worth Division and the F-16 program will likely lead to increased globalization in the near future. Grumman's F-14, A-6, and E-2 programs are outdated and demand for more modern aircraft has limited overseas demand for the company's products. GM-Hughes Electronics and Loral produce sophisticated electronics and combat systems for many of the world's most powerful aircraft and are also likely to benefit.

The proven effectiveness of air defense systems during Operation Desert Storm has driven foreign demand for products from Martin Marietta and Raytheon. The Patriot and Hawk surface-to-air missile systems are battle-tested and popular overseas. Upgrades and further support contracts offer the potential for continued growth in air defense systems.

However, declining world demand for armored vehicles and strategic missiles has essentially closed off foreign markets for some companies. Although General Dynamics' Land Systems Division has seen overseas orders for its M1A1 and M1A2 tanks surge in the last few years, armored vehicle procurement has essentially stopped. General Dynamics expects to continue producing tank components for foreign nations until FY 1996 [Ref. 2:p. 3-18] Accordingly, the Land Systems

division is for sale and pursuing overseas customers is a short-term tactical decision until such a sale is complete.

The U.S. shipbuilding industry also faces bleak prospects at home and abroad. Building warships for exports does not appear to be a viable alternative since U.S. shipyards find it difficult to compete against the cheaper, often subsidized foreign shipyards. Demand for ships, both military and commercial, is also fading as 1992 showed the first decline in the number of ships on order or under construction in the world since 1987 [Ref. 56:p. 21-1]. Since the 1960s, fewer than 15 warships have been built in U.S. shipyards for foreign navies [Ref. 57:p. 28]. Litton's Ingalls Shipbuilding subsidiary has the only significant contract for construction of a foreign ship in a U.S. shipyard [Ref. 58:p. 11].

Finally, Northrop's B-2 and MX Peacekeeper programs accounted for nearly 60 percent of its 1992 revenues. The company's presence in strategic weapons has and will continue to hinder globalization. The emphasis on tactical weaponry is evidenced by the Peacekeeper's sharp reduction in sales, from $359 million to $46 million between 1988 and 1992. [Ref. 41:p. 29]

4. Summary of Globalization Factors

Given the current world conditions regarding defense spending and military tensions, the new defense market is becoming increasingly globalized with an emphasis on tactical

weapons. Of particular interest is the fact that Northrop, given its high exposure to defense spending, has chosen not to globalize, while Boeing, given its moderate exposure, has chosen to globalize. The Northrop and Boeing examples illustrate that exposure to foreign sales is perhaps a better factor in determining which companies are not likely to expand globally. However, neither factor proved to be a good predictor of which company would likely globalize. The demand for a company's product will continue to be the driving force behind the globalization strategy and is the only adequate predictor of the globalization strategy.

The previous three chapters have explored strategies for companies with the desire to expand or maintain their businesses. The final strategy offers an alternative that is also becoming increasing popular--rationalization or downsizing. Several companies are downsizing to focus on core business competencies and several appear to be exiting the defense market completely.

VI. RATIONALIZATION--FOCUSING ON CORE BUSINESSES

A. FUNDAMENTALS OF RATIONALIZATION

Rationalization is a business strategy that combines both downsizing and consolidation. Downsizing is the shrinking of individual operations and consolidation is reducing the number of business units or operating segments. Defense companies are downsizing both their defense businesses and commercial businesses in order to focus on core business strengths. This chapter will address the rationalization strategy and its many advantages. Succeeding sections will focus on the companies that are pursuing the strategy and the factors that have guided management's decision to pursue such a strategy.

As represented by Figure 15, rationalization is an attempt to manage for cash. Unprofitable or low growth businesses are sold and cash is reinvested into core businesses or returned to shareholders. William Anders, the chief proponent of rationalization, believes that burdening a business with unnecessary assets reduces returns and adds unnecessary costs, making the company less attractive to investors and customers. Anders favors a more "businesslike" approach to focusing on what a company does best. [Ref. 7:p. 9].

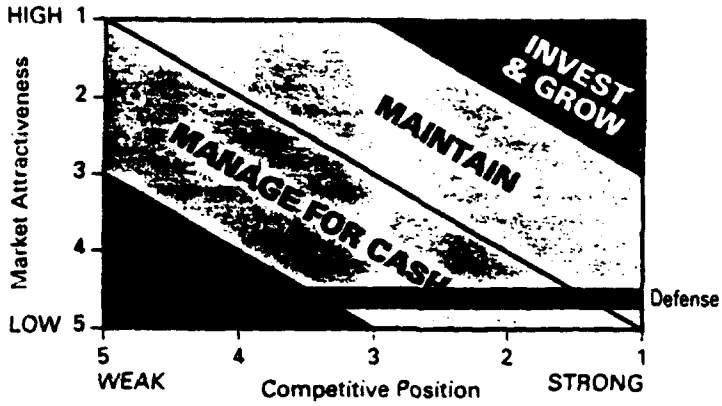


Figure 15: The General Dynamics Strategic Matrix

Companies need to be smaller, stronger, and more flexible. Many industry analysts question the logic of traditional strategies such as commercial diversification and globalization. They argue that the current environment does not encourage growing faster than the industry, but in shrinking faster than the industry. [Ref. 32:p. 31]

Downsizing enables firms to shrink the size of their operations and focus on their critical mass. Critical mass is the "proper amount and balance of work and resources necessary to produce and support high-quality, affordable weapons systems." [Ref. 59:p. 16] Inefficiencies and excess capacity are eliminated. Rationalization of "noncore" assets eliminates management diversion towards business units that are not considered core strengths.

Nearly canceled due to soaring costs, the F-22 is a prime example of the benefits of pursuing this strategy. A joint venture between General Dynamics, Lockheed, and Boeing, the F-

22 came under increasing pressure from the Pentagon and Congress. As demand for other defense products fell, the F-22's share of corporate overhead steadily increased. However, General Dynamics' sale of its fighter division to Lockheed resulted in one less overhead bill and helped bring costs under control. Critical mass was achieved, the government realized lower prices, and consolidation in the industry took place. [Ref. 4:p. 94]

A substantial portion of the proceeds from divestitures is also returned to shareholders. Between January 1991 and October 1993, General Dynamics, the first major defense company to aggressively downsize, has seen its stock price soar from $25 to nearly $100 per share. General Dynamics declared three special dividends in the last year of $20, $18, and $12 per share. Based on 31 million outstanding shares, General Dynamics has returned approximately $1.6 billion to shareholders or $50 per share [Ref. 60:p. 7]. William Anders has also repurchased more than $1 billion of General Dynamics stock [Ref. 4:p. 94]. In an interview with Fortune, Anders outlined his feelings on returning excess cash to shareholders:

> Who can best decide how to reinvest in America? The answer is the American people. They are the people whose investment provides the capability for us to do government business. [Ref. 19:p. 57]

One of the criticisms of this strategy is that not all divestitures are in the best interests of the defense industrial base, and are merely a reshuffling of excess

capacity. Other critics argue that rationalization is done for short-term financial gain at the expense of long-term viability. Despite these criticisms, buyers continue to surface and rationalization continues to move forward. The next section of the thesis highlights some of the most significant events associated with rationalization efforts.

B. DEFENSE COMPANIES IN PURSUIT OF RATIONALIZATION

Table XXVII provides a summary of the top defense companies pursuing a rationalization strategy. The companies were selected based upon their commitment to focus on core businesses. All six of the rationalizing companies have publicly stated their downsizing strategies. GE is downsizing to focus on its commercial businesses, while the remaining companies are downsizing to focus on core defense capabilities. Over the past three years, these six companies have each seen revenues fall an average of $2.5 billion. This reduction is a combination of downsizing and the unprofitable businesses within these companies that will be discussed later. The nine non-rationalizing defense companies have actually seen revenues climb an average of nearly $300 million each since 1990. With the exception of Westinghouse Electric, all of the companies listed in Table XXVII are pursuing rationalization as their primary strategy. Westinghouse's dowinsizing has thus far been limited to its financial services business and is secondary to its diversification strategy, as outlined in Chapter IV.

TABLE XXVII: DEFENSE COMPANIES PURSUING A RATIONALIZATION STRATEGY

RATIONALIZATION STRATEGY	
Primary	Secondary
General Dynamics General Electric Grumman Litton Industries McDonnell Douglas	Westinghouse Electric

1. General Dynamics

General Dynamics has been aggressively downsizing its operations since January 1991. Its major divestitures include its missile business to GM-Hughes Electronics, electronics business (now known as GDE Systems Inc.) to The Carlysle Group, Cessna commercial aircraft business to Textron, and data systems division to Computer Sciences Corporation. In October 1993, General Dynamics announced that it is negotiating with Martin Marietta concerning the sale of General Dynamics' space-launch business. If completed, General Dynamics will be left with only its tank manufacturing plants (M1A1 and M1A2 tanks) and submarine business (Trident and Seawolf submarines). Both of these units are also for sale. Talks concerning FMC's acquisition of General Dynamics' Land Systems Division ended in 1992 and no prospective buyers have surfaced since. However, recent Pentagon initiatives to guarantee the financial health and manufacturing capability

for these two sectors may improve General Dynamics' ability to attract a buyer [Ref.61:p. C1].

2. General Electric

Jack Welch, Chairman and CEO of GE, has stipulated that the company's business must be either number one or two in their markets. Dubbed "Trader Jack," Welch has divested 289 lackluster businesses, raising $10 billion and spent $19 billion on what he hoped would be better ones since 1981 [Ref. 29:p. 24]. In November 1992, GE's aerospace business was combined with Martin Marietta, creating the world's largest aerospace electronics company. GE kept its defense aircraft engine business since it complements its commercial aircraft engine business. The future of GE's federal contract work is in aircraft engines, where revenues from the Pentagon fell from 40 percent in 1990 to 33 percent in 1992 [Ref. 62:p.34].

3. Grumman

With a firm commitment to remain in the aerospace business, which constitutes approximately 70 percent of revenues, Grumman is divesting unprofitable and noncore businesses. Grumman considers these businesses to be "distractions to management." [Ref. 63:p. 2] Grumman has exited the fire truck business, sold Grumman Data Systems Institute and is discontinuing its reinsurance subsidiary, Paumanock Insurance Company, Ltd. In an effort to make its core business stronger and more competitive, Grumman consolidated its aircraft and electronics businesses into one

operating group. These divestitures and corporate restructuring have enabled the company to increase its quarterly dividend, strengthen its balance sheet, and reduce its total debt nearly 70 percent in two years [Ref: 64:p. 1].

4. Litton Industries

Rather than selling off pieces of its business, Litton's unique approach is to establish a new and independent company that will concentrate solely on the company's growing commercial businesses. Litton's commercial spinoff will be called Western Atlas, Inc. and will include Litton's resource exploration services and industrial automation segments. These businesses account for approximately $2 billion in annual revenue. Management believes that commercial and defense businesses need different strategies and this split will allow management to better focus on each task. Litton Industries will maintain its advanced electronics and marine engineering and production segments. [Ref. 65:p. 2]

5. McDonnell Douglas

Despite facing tough times because of the airline recession, Chairman and CEO John F. McDonnell declared that "Our future is aerospace" and is shedding business segments not number one of two in their field [Ref. 40:p. 5]. McDonnell Douglas believes that it is number one or number two in combat aircraft and missiles, space, and electronics, and believes it is number one in transport aircraft [Ref. 40:p. 5]. Already sold are Telecheck Services, Inc., the company's

data processing assets, McDonnell Douglas Systems International, Visual Simulation Systems, and its North American Field Service business. McDonnell Douglas Finance Corporation, a world leader in aircraft and equipment leasing, shed 22 percent of its assets in 1992 to focus on its core markets [Ref. 40:p. 18].

The company's Douglas Aircraft subsidiary is running a distant third behind Boeing and Airbus in the commercial airline market. The failure of Douglas to find a strategic partner, most notably Taiwan Aerospace, means that Douglas is now considered "non-core". DRI is predicting that McDonnell Douglas will exit the commercial aircraft business by the end of the decade. [Ref. 32:p. 22]

In order to better focus on its core defense businesses, McDonnell Douglas consolidated its six defense businesses into two divisions--the Eastern Division, which includes combat aircraft, missiles, and helicopters, and the Western Division, which includes space systems, electronics systems, and Douglas Military (C-17 program). Reports earlier this year said McDonnell Douglas was in preliminary talks on the possible sale of its missile and helicopter businesses, as well as its laser systems division. McDonnell Douglas Aerospace makes the Harpoon anti-ship missile, the Standoff Land Attack Missile, and Tomohawk cruise missile, as well as the Apache and MD helicopters. [Ref. 66:p. 5]

6. Westinghouse Electric

Michael H. Jordan, a former PepsiCo executive, was hired on June 30, 1993 to improve Westinghouse Electric's poor operating performance. He is divesting financially troubled businesses and focusing on five core areas: power systems, electric systems, environmental services, temperature control devices, and broadcasting. The annual report claims that, "These are markets we understand, serving customers we know, involving technology where we are strong." [Ref. 45:pp. 4-5] As part of its restructuring, Westinghouse has identified its distribution and control business unit, Westinghouse Electric Supply Company, The Knoll Group, and Westinghouse Communities for divestiture. Asset sales for Westinghouse Financial Services, Inc. (WFSI) commenced in February 1991 and are nearly complete. [Ref. 32:p. 87].

While most defense companies are consolidating plants and laying off personnel, the companies analyzed in this chapter are also reducing their number of businesses and reshaping their business mix through divestitures. Although not intended to be all inclusive, Table XXVIII provides a summary of the major defense industry rationalization highlights. The next section of the chapter will examine the factors that have framed the rationalization strategy.

TABLE XXVIII: DEFENSE INDUSTRY RATIONALIZATION HIGHLIGHTS

General Dynamics
1993: -Announces plans to sell space division to Martin Marietta -Completes sale of Fort Worth division to Lockheed 1992: -Sells missile business to Hughes Aircraft Company -Sells electronics division to The Carlysle Group -Sells Cessna aircraft business to Textron -Sells data systems division to Computer Sciences Corporation -Sells American Overseas Marine Corporation to International Shipbuilding Corp.
General Electric
1993: -Sells aerospace unit to Martin Marietta
Grumman
1992: -Combines aircraft and electronic units into one operating group -Sells Grumman Data Systems Institute -Announces plans to discontinue Paumanock Insurance Co., Ltd -Exits the fire truck business
Litton Industries
1993: -Announces plans to spinoff separate commercial company
McDonnell Douglas
1993: -Sells McDonnell Douglas Information Systems International -Sells Visual Simulations Systems business 1992: -Consolidates six defense businesses into two -Announces laser systems business and McDonnell Douglas Helicopter Company are for sale -Sells Telecheck Services, Inc. 1990: -Sells North American Field Services business
Westinghouse Electric
1993: -Announces broadcasting business is for sale 1991: -Begins liquidation of Westinghouse Financial Services Inc.

Source: Wall Street Journal Index; 1992 Annual Report

C. FACTORS SHAPING STRATEGY SELECTION

Rationalization should be expected under two scenarios. First, those companies which have minimal exposure to defense spending are more likely to pursue such a strategy. Second, those companies which own or operate business units that do not reinforce or take advantage of the company's core competencies are more likely to downsize. Unlike previous strategies where the interaction of all factors was the final determinant of strategy selection, these two factors are considered separately, as illustrated in Figure 16. Rationalizing companies need to only satisfy the criteria of one of the factors, not necessarily both. The companies will therefore also be analyzed separately, based on the factor that guided their selection of the rationalization strategy.

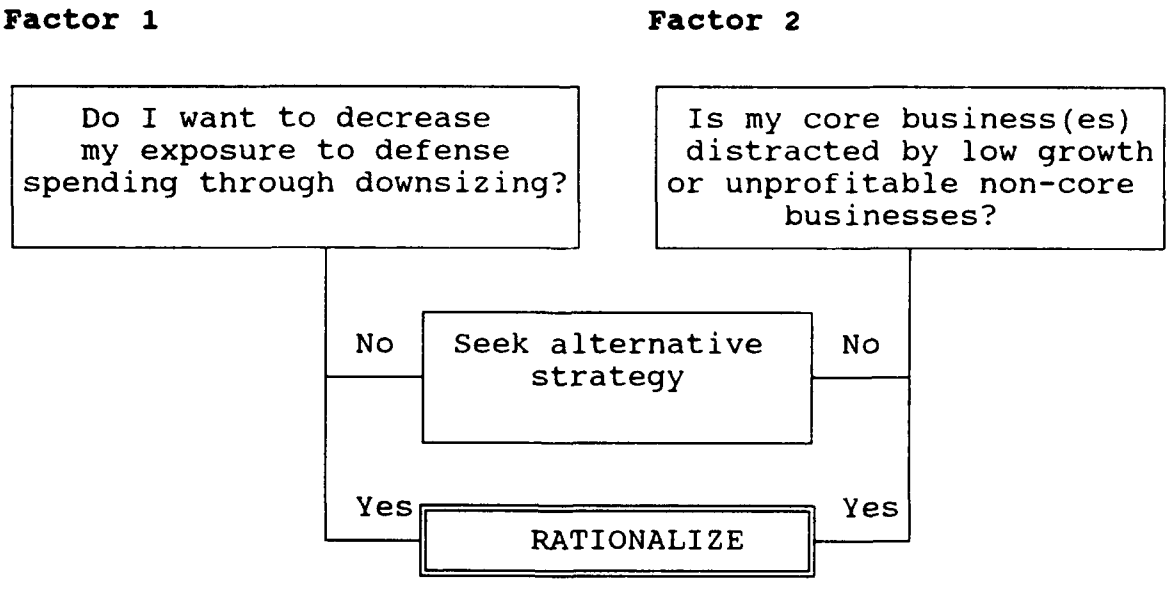


Figure 16: Factors Framing the Rationalization Strategy

1. Exposure to Defense Spending

As was discussed in previous chapters, defense companies must first consider their exposure to defense spending. Companies with higher exposure are oriented towards government unique accounting practices, standards, and specifications, and audit and oversight roles, thus making their strategy selection less flexible. These companies are likely to maintain or increase their defense investments. Given the cutbacks in defense spending, it is expected that those companies which have less exposure are more likely to downsize or reduce their investment in defense.

Table XXIX lists the top DoD contractors based on 1991 defense and space revenues, as a percentage of total revenues [Ref. 10:p. 60]. Since the two factors are considered separately, only GE is listed in bold, indicating it is the only top defense company rationalizing in order to reduce defense exposure. The data supports the concept that minimally exposed companies will downsize their defense businesses. However, companies with higher defense investments are downsizing to focus on core defense businesses--the focus of the next section. Exposure to defense spending is therefore only a good predictor of which companies will likely reduce their <u>defense</u> investments.

TABLE XXIX: EXPOSURE TO DEFENSE SPENDING

Company	Percent	Category
Grumman	90.8	Extremely Exposed
Northrop	89.6	
Martin Marietta	85.6	
Lockheed	85.0	
General Dynamics	84.6	
Loral	75.3	
McDonnell Douglas	55.1	Highly Exposed
Raytheon	53.9	
GM-Hughes Electronics	49.6	
Litton Industries	46.9	
Rockwell	43.6	
United Technologies	25.9	Moderately Exposed
Westinghouse Electric	25.4	
Boeing	19.9	
General Electric	12.3	Minimally Exposed

Note: Percent = 1991 defense and space revenues as a percentage of total revenues

Source: DRI/McGraw-Hill

2. Core Versus Non-core Business Competencies

The previous section indicated that GE reduced its defense investment in order to concentrate on its core commercial businesses. Likewise, the remaining five companies are downsizing to focus on core defense businesses. It is expected that those companies with financially troubled, unprofitable, or low growth non-core businesses will be most likely to pursue the rationalization strategy. Non-core businesses are considered those that generate less than 30 percent of total revenues. These non-core businesses are distractions to management and drags on corporate earnings.

General Dynamics began by shedding a series of commercial businesses that did not reinforce its core defense businesses. Yet General Dynamics also faced extreme uncertainty in its major defense businesses. The maturity of the F-16 program and uncertainty about the future of the Multi-Role Fighter and the A/FX raised questions about the future viability of the Fort Worth Division [Ref. 67:p. 30]. F-16 production was also stricken with quality control problems that led to production delays. Current order backlogs for the M1A1 and M1A2 main battle tanks are only expected to keep production lines open until 1995. The Electric Boat Division's submarine business is a victim of budget cuts and the space systems segment is facing increased competition at home and abroad. [Ref. 68:p. 37]

Grumman's principal defense products are mature and facing declining revenue prospects. The A-6 Intruder line shut down in 1992 after 30 years of production, the EA-6B is in its fifth generation, the last new F-14 Tomcat was delivered in 1992 ending a 23 year production run, and there was no production funding in the FY 1993 budget for the E-2C Hawkeye [Ref. 63:p. 3]. Grumman is divesting non-aerospace businesses and is using the cash to pay off its debt and to fund next generation defense systems. These systems include Joint STARS, a battle management and control system that performed well in Operation Desert Storm, and the Air Force's Follow-on Early Warning System (FEWS), a space-based system

that detects and tracks missiles and launchers, and the AX, the Navy's next generation attack aircraft that is scheduled to replace the A-6. Grumman is teamed with TRW in the FEWS project and Boeing and Lockheed in the AX project.

McDonnell Douglas is facing a weak commercial airline market, a troubled C-17 Globemaster III program, and weak performance by its complementary businesses. In 1992 the company took nearly $400 million in losses for the C-17 and was troubled with massive cost and schedule overruns, as well as performance problems [Ref. 33:p. 79]. Operating earnings from the company's complementary businesses, including McDonnell Douglas Finance Corporation, have fallen from over $100 million in 1990 to just over $20 million in 1992 [Ref. 40:p. 18].

Westinghouse Electric has seen revenues erode in the past several years since many of its businesses are driven by the business cycle. Westinghouse Financial Services, Inc. (WFSI) has also been a drag on earnings. It was estimated that nearly 40 percent of WFSI's $10 billion portfolio was considered "troubled or potentially troubled". Financial segment revenues have fallen more than 30 percent since 1990 and only the company's power systems division has shown an uptrend in revenues since 1990. [Ref. 32:pp. 87-89]

Litton Industries is the exception to the above two factors. The company is neither minimally exposed nor is it troubled by unprofitable or low growth business segments.

Only Litton's advanced electronics business has shown flat earnings, while the remaining three businesses have all shown sharply rising sales figures. Litton's downsizing is based upon management's vision of two independent companies, both strong in their respective businesses. By shedding the commercial businesses, Litton can better concentrate on its advanced electronics segment and core defense capabilities.

Excluding GE and Litton, all of the rationalizing companies have been plagued by low growth or unprofitable businesses that have distracted management from their core businesses. The remaining top defense companies have all shown strength in most of their non-core businesses. Of the 19 non-core business segments operated by the non-rationalizing companies, only four have shown a reduction in revenues since 1990 and only Northrop's services and electronics businesses have shown a reduction in excess of ten percent. Put in perspective, WFSI alone saw revenues decline 30 percent since 1990 and in 1991 wrote off more than $1.7 billion in troubled assets [Ref. 32:p. 87]. It is evident that those companies which are plagued by troubled business segments and the need to concentrate on their core businesses are more likely to rationalize.

3. Summary of Rationalization Factors

It appears that there is some merit to the expectation that in today's competitive world and tight spending environment, focusing on core businesses by downsizing and

shedding unprofitable businesses is a rational strategy. Streamlined and flexible companies may be the ones to survive this new era of defense spending. Companies like GE who have minimal exposure to defense spending are likely to rationalize or exit the defense market completely. Those companies with higher exposure to defense spending will likely rationalize if management is being distracted by poorer performing business segments. Companies such as Loral, which is highly profitable, highly exposed to defense spending, and operates in only one business segment (defense electronics) are the least likely to rationalize. While these two situational factors appear to be adequate predictors of rationalization, Litton Industries makes it clear that management's discretion is the ultimate factor.

VII. CONCLUSION

The objective of this thesis was to identify and assess the corporate strategies adopted by the top defense companies as a result of defense budget reductions. The model used throughout this thesis was the General Dynamics strategic matrix pictured in Figure 17. The model stipulated four corporate strategies: expansion, diversification, globalization, and rationalization. The expansion and diversification strategies were variants of the invest and grow approach, while the globalization and rationalization strategies represented the maintain and manage for cash sections of the matrix. Anders argued that only the strongest defense companies should maintain their defense investments and none should expand. However, this thesis has shown that the competitive position and opportunity to compensate for reduced military business vary not only from defense sector to defense sector, but from company to company.

Table XXX provides a summary of the strategies selected by the major defense companies. The table indicates that each of the strategies was pursued to nearly the same degree. Many of the companies are pursuing multiple strategies. This is to be expected, considering that some of the strategies are complementary. The table also indicates that expanding companies are also likely to diversify into commercial markets

and globalize. Expansion and rationalization are inverse strategies, i.e., they will not be pursued by the same company. Litton Industries is the exception.

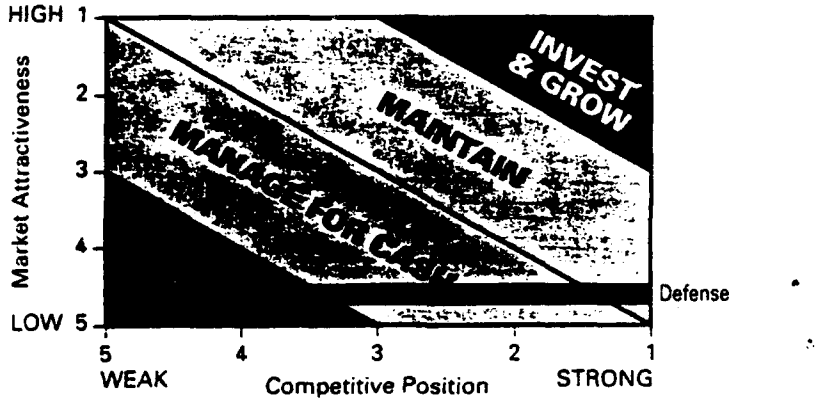


Figure 17: The General Dynamics Strategic Matrix

The table also shows that Litton and Northrop are not pursuing anything that can be identified as a primary strategy. These companies have pursued no single strategy aggressively or shown no clear indication of favoring one strategy over another. Litton is expanding its defense business while spinning-off its commercial business and Northrop has only recently made modest attempts at diversification.

TABLE XXX: SUMMARY OF DEFENSE SECTOR STRATEGIES

Company	Expansion	Diversify	Globalize	Rationalize
Boeing			P	
General Dynamics				P
General Electric				P
GM-Hughes	P	S	P	
Grumman				P
Litton	S			S
Lockheed	P	S		
Loral	P	S	S	
Martin Marietta	P	P	S	
McD Douglas			S	P
Northrop		S		
Raytheon	S	P	S	
Rockwell		P	P	
United Tech			P	
Westinghouse		P		S

Note: P = Primary Strategy
S = Secondary Strategy

This thesis evaluated the factors that framed the selection of strategies by defense company management. Exposure to defense spending was considered in each of the strategies. It was expected that more exposed companies would be more likely to expand and globalize. This did not prove to be so, as other factors were more influential in shaping

strategy selection. Exposure to defense spending was also not a strong predictor of diversification. Some analysts argued that the specialized nature of doing business with the Pentagon inhibited diversification, while others argued that diversification is an effective way to hedge against further spending reductions. The data did, however, indicate that those companies which are minimally exposed will be more likely to reduce their defense investments and less likely to expand. Generally, these differences in defense exposure did not tell much about how management would react to defense spending cuts.

Exposure to foreign sales, both military and commercial, proved to be a strong predictor of globalization. Those companies with the global infrastructure already in place are best able to handle the additional risks and requirements of further globalization. With minimal exposure to defense spending, Boeing led all of the top defense companies in exports, which constituted 57.9 percent of 1992 sales, and is seeking further expansion overseas. Companies such as Northrop, which has very little international business, are least likely to globalize. Exposure to foreign sales proved to be an adequate predictor of who <u>will not</u> globalize, but was a weak indicator of who <u>will</u> globalize.

Because of the lead time resulting from backlogs and aggressive cost cutting, the financial viability of the top defense companies is not at risk. Financial strength was

expected to be a strong predictor of both expansion and diversification. Liquidity and ability to incur additional levels of debt were adequate indicators of those companies likely to expand and diversify.

However, the financial strength of nearly all of the top 15 defense companies made it difficult to determine the impact of weak finances on strategy implementation. As noted in Chapter III, only Lockheed and McDonnell Douglas are ranked below B+ in financial strength by The Value Line Investment Survey. The financial strength of these companies is reflected in their stronger balance sheets compared to the industry average figures. Strong stock price performance in the defense industry reflects, at least in part, the underlying success of the companies' post Cold War strategic choices.

Market sector growth opportunities and existing core competencies proved to be the best predictor of strategy selection. Defense electronics is the only defense segment offering the potential for growth. Those defense companies with a strong presence in this area, such as Loral and GM-Hughes Electronics, are most likely to expand. Likewise, those companies with core strengths in any number of fast growing commercial sectors are likely to diversify. Satellite communications and advanced electronics are two such segments that are showing rapid growth. Overseas demand drove globalization and laggard growth in non-core business segments

prompted rationalization and downsizing. This compatibility between current skills and production capabilities with market opportunities was perhaps the most influential factor in strategy selection.

It is estimated that the number of defense suppliers has dropped from nearly 138,000 to fewer than 40,000 between 1982 and 1987 [Ref. 69:p. 38]. No one is sure how much further it will go. However, the top 15 defense companies have all streamlined operations and developed strategies for guiding them through the new defense spending environment. While no one currently knows if these strategies will prove to be successful, it is apparent that the new defense industrial base will be stronger, leaner, and more flexible. In his address to the American Defense Preparedness Association in 1992, then President Bush summed up the importance of the defense industrial base by stating:

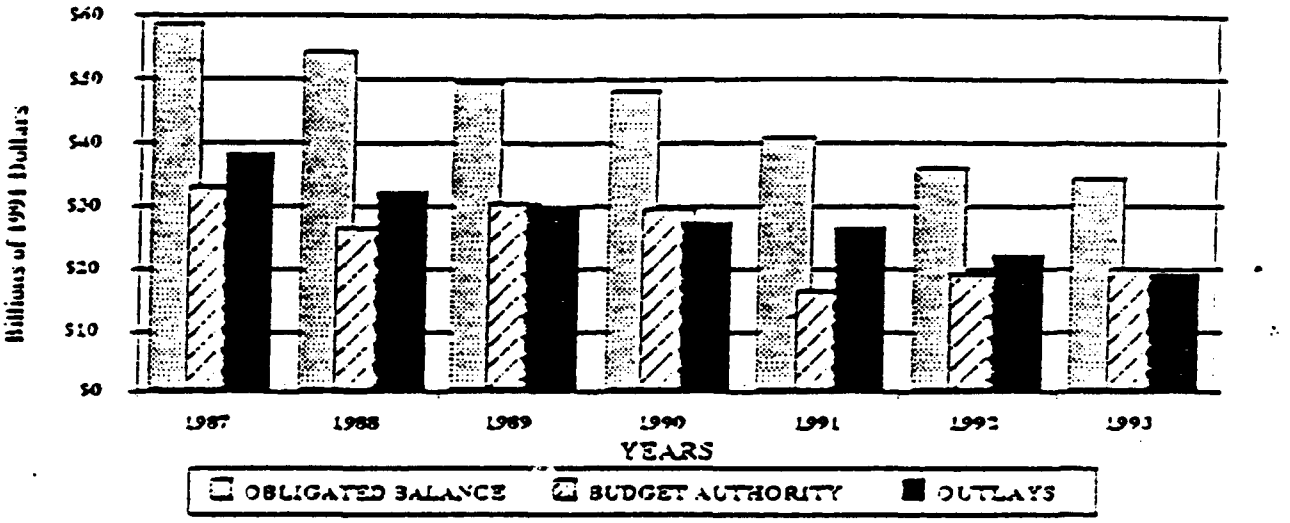
> U.S. military strength and our defense industrial base are inextricably linked. We cannot long maintain that strength if we allow our defense industry to erode. We must never forget that it is American industry that created American might. Our military strength is inseparable from the genius of American engineers, the character of American industrial workers, and the resilience of our market-based economy. [Ref. 70:p. 6]

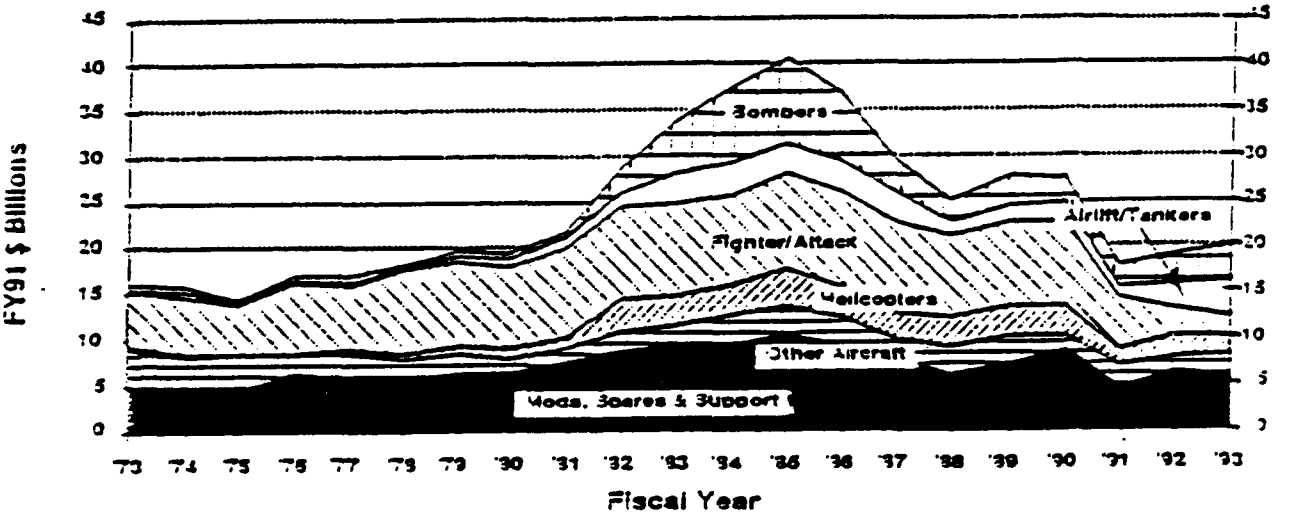
As weapons systems become more complex and more costly, fewer defense companies will be able to make them. Consolidation will continue to reduce the number of defense companies and excess capacity will be eliminated. However, tensions and conflict throughout the world will continue to support some level of U.S. defense spending. Demand for

defense products will continue and those companies who survive the current downsizing will be the ones to profit in the future. Proper strategy selection and effective implementation are critical not only to the survival of the company, but to the survival of the United States as well.

APPENDIX A

DOD AIRCRAFT PROCUREMENT TRENDS
(Total Obligational Authority)

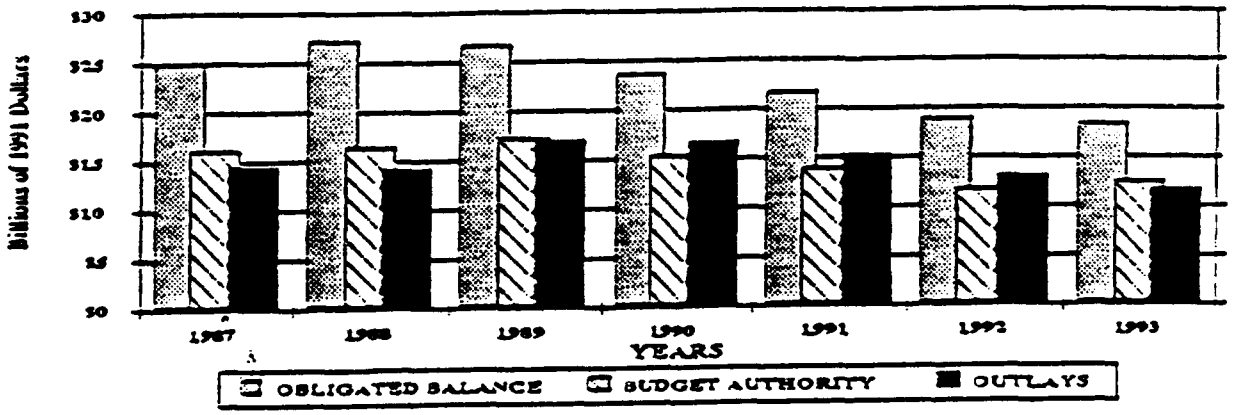


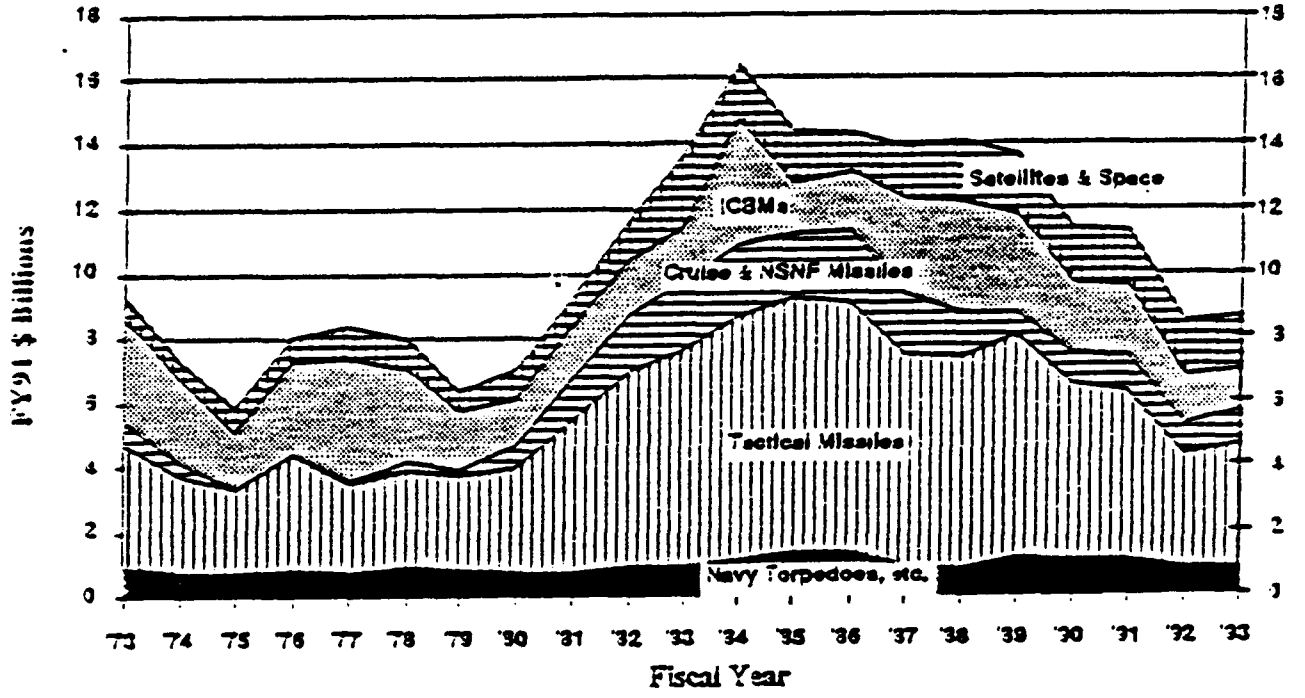


Source: Budget of the U.S. Government (FY 1992); Actual data (historic); and FY 1992 President's Budget (projections)

APPENDIX B

DOD MISSILE AND SPACE PROCUREMENT TRENDS
(Total Obligational Authority)

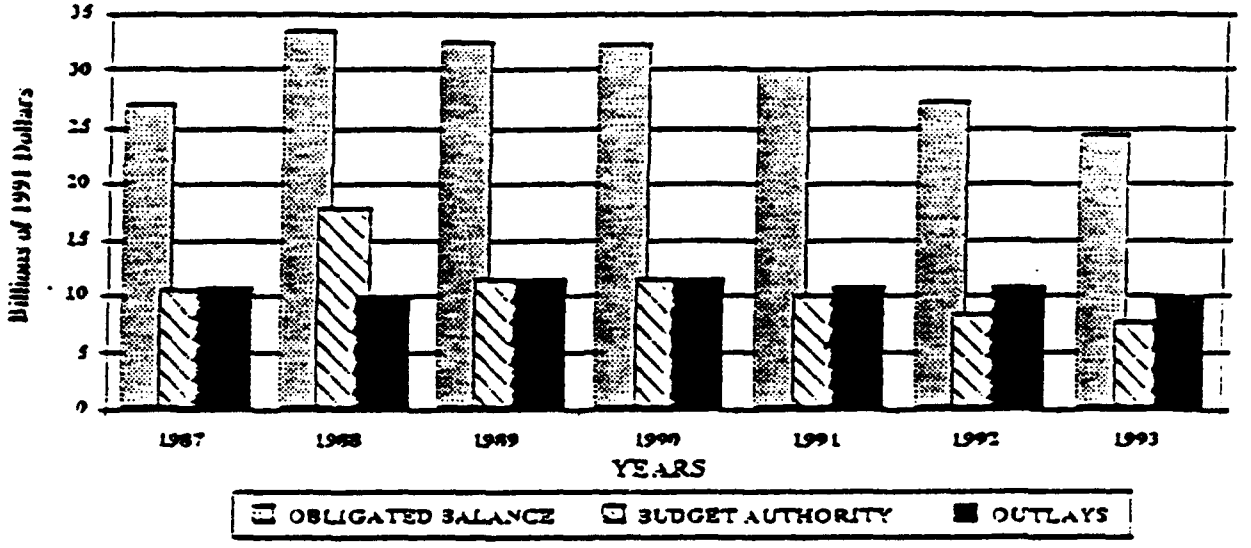


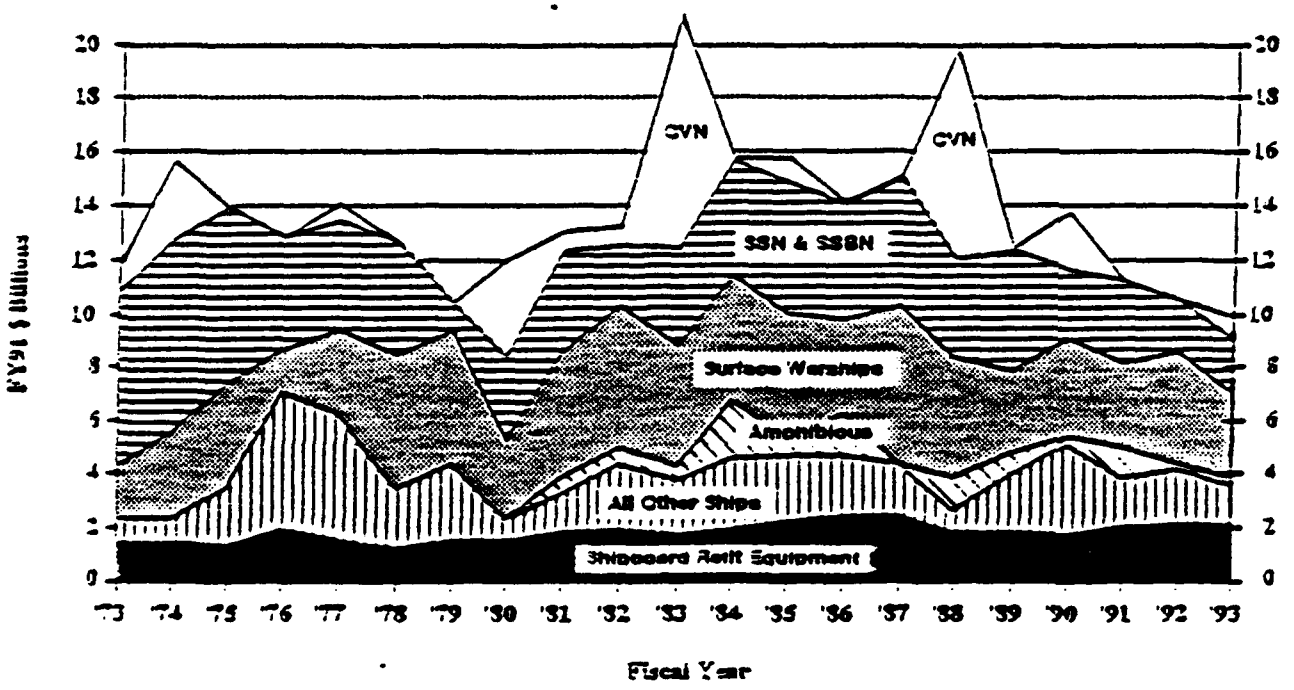


Source: Budget of the U.S. Government (FY 1992); Actual Data (historic); and FY 1992 President's Budget (projections)

APPENDIX C

DOD SHIPBUILDING PROCUREMENT TRENDS
(Total Obligational Authority)

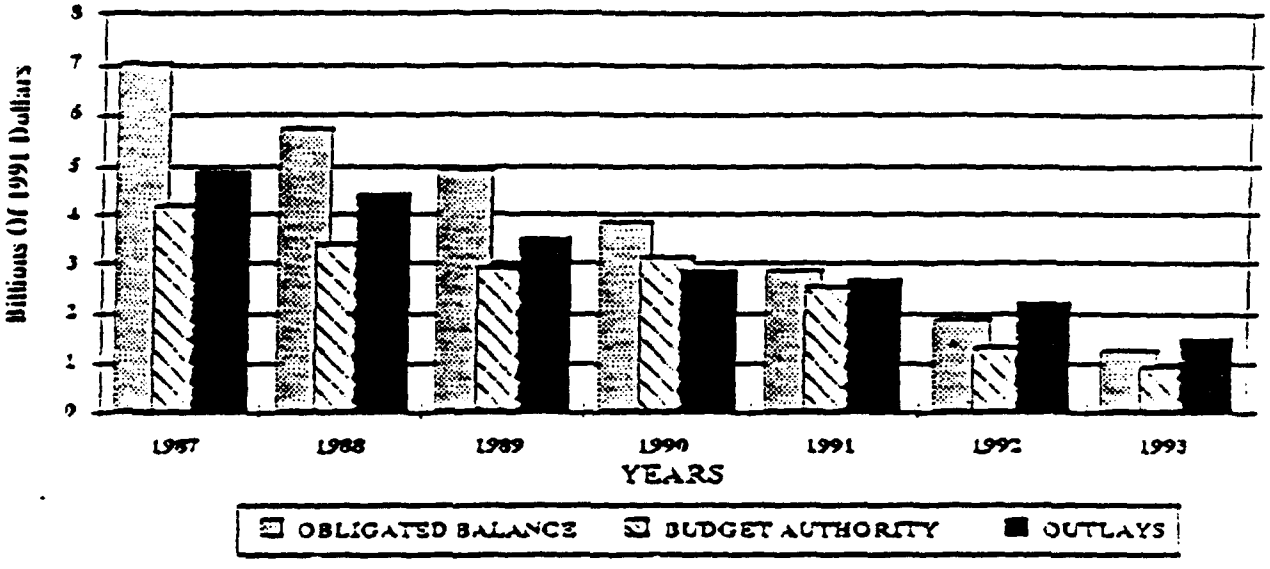


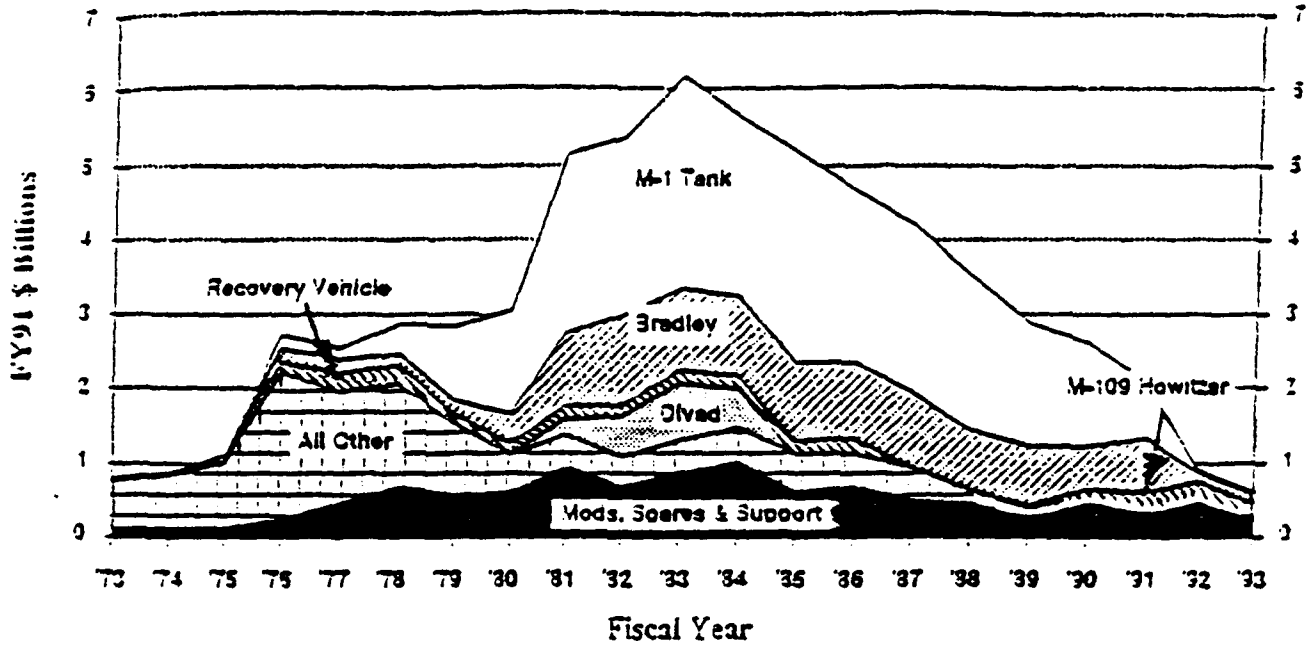


Source: Budget of the U.S. Government (FY 1992); Actual Data (historic); and FY 1992 President's Budget (projections)

APPENDIX D

ARMY WEAPONS AND TRACKED COMBAT VEHICLES PROCUREMENT TRENDS
(Total Obligational Authority)





Source: Budget of the U.S. Government (FY 1992); Actual Data (historic); and FY 1992 President's Budget (projections)

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